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JULY 1934

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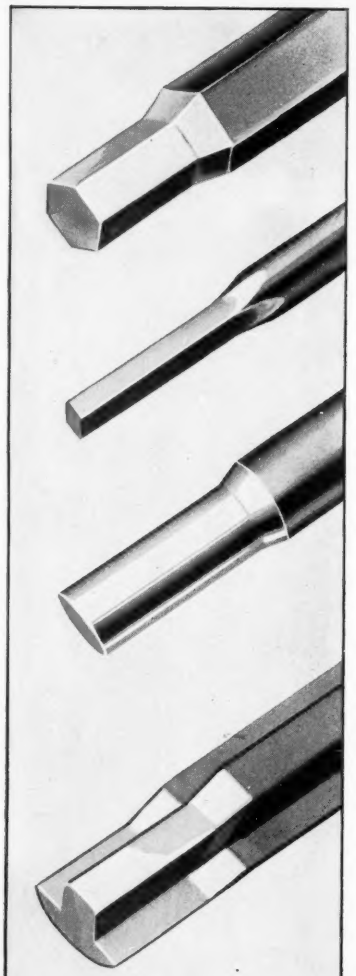

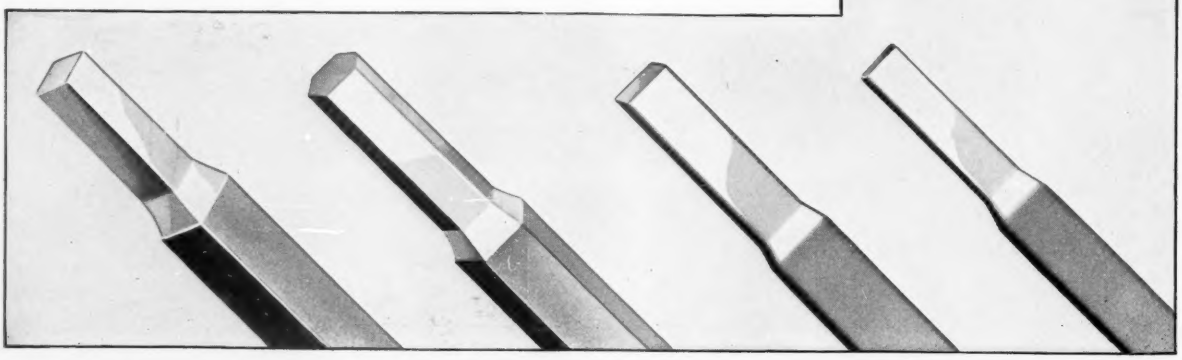

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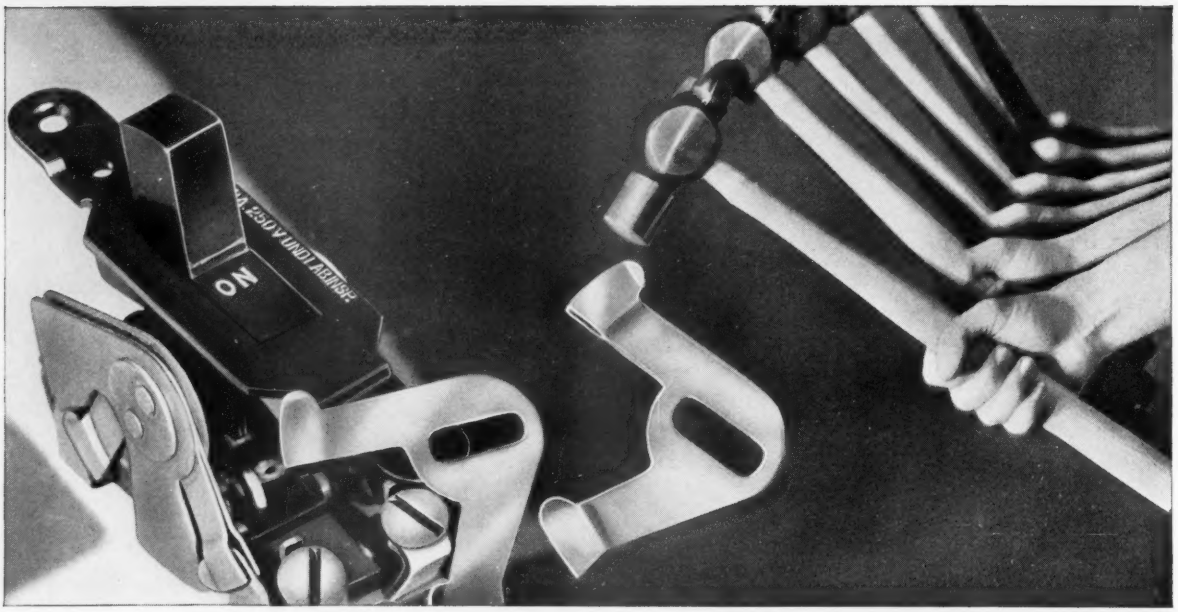

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip Wire Products and Insulated Wire and Cable.

DRAWING—ROLLING—EXTRUDING—FORMING—FABRICATING

Vol. 9 July 1934 No. 7

Designated as

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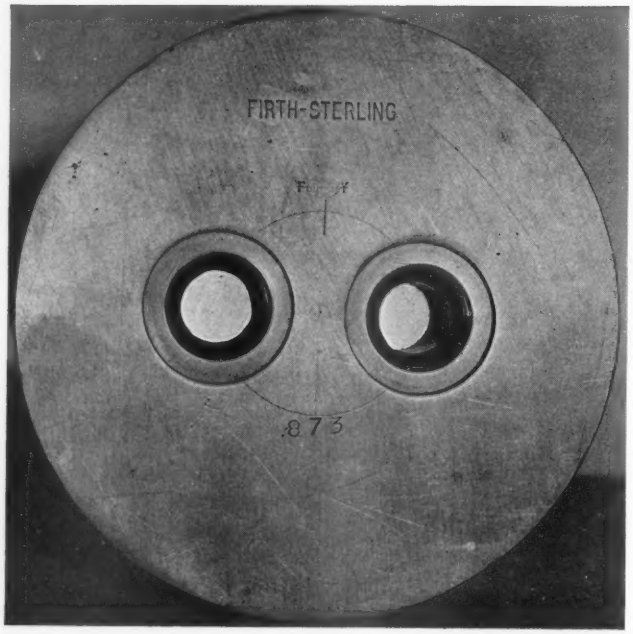

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING --- ROLLING --- EXTRUDING --- FORMING --- FABRICATING

Vol. 9 July 1934 No. 8

WIRE ROPE

Construction, Application and Discarding With Data Pertaining to Fittings for Same

By C. D. Meals

Wire Rope Engineer, B. Greening Wire Co., Ltd.
Hamilton, Ont., Canada

Research data of interest to both manufacturers and users of wire rope and wire rope fittings, together with tables of formulae for solution of engineering problems arising in connection with same.

THIS year 1934 is the centenary year of the making of wire rope, as it was in 1834 that **Albert of Clausthal,** Germany, made the first wire rope of soft iron wire; it was made by hand and replaced the unsatisfactory hemp ropes used in the Hartz mines.

✦ ✦ ✦

SMITH and **HOOD** made the first wire rope in England in 1836 and Roebling in 1841 in America; all these ropes were made by hand on a "rope-walk" in the same manner in which hemp ropes were made.

✦ ✦ ✦

THE first important development in wire rope making took place in 1840, when **Newall** of England was granted a patent for a machine for making wire rope; a friend studying mining in Saxony, wrote **Newall** in June 1838, describing a wire rope and urging him to invent a machine for making wire rope as the method used in Germany then was "slow and unscientific".

An address given to the Engineering Institute of Canada at McMaster University, Hamilton, Ont., May 8, 1934.

IT was not until 1875 that the development of the various constructions of wire rope was started; **Lang** of England patented "Lang lay" rope in 1879; **Batchelor** of England patented the 18x7 Non-Rotating rope in 1884; **Latch & Batchelor** of England patented locked wire cable in 1884 and flattened strand ropes in 1888 and **Conners** of Bridgeport, Conn., patented Tru-lay preformed wire rope in 1923.

✦ ✦ ✦

IT is interesting to note that the object of **Batchelor's** patent of 1884 of the 18x7 rope, was to produce a wire rope with a smooth exterior surface and it is a remarkable fact that although this rope is non-spinning under load, yet nothing was stated in the patent to suggest that it possessed such a desirable and sought-for characteristic as that of non-spinning. **Roebling** in 1875 and **Newall** in 1876 both had obtained patents on the Alternate Right and Left lay rope, as a non-rotating rope but it did not possess the non-spinning properties claimed.

✦ ✦ ✦

SEALE construction of rope was patented by **Thos. Seale** and the marlin-covered and armour clad wire ropes were developed in the early 1900's.

✦ ✦ ✦

Cause of Development of Wire Rope

"TRANSPORTATION" was the prime mover in the development of wire rope; **Albert** of Germany, **Smith and Hood** of England as well as **Newall,** were interested in getting or transporting coal out of the mines; **Roebling** in America was concerned with the improvement of transportation by canal and later with suspension bridges.

MINING of coal and metals from great depths, huge logging operations, construction work, the modern high buildings and many engineering and construction feats of today would hardly be practicable without wire rope.

✦ ✦ ✦

Wire for Wire Rope

WIRE is an ancient product; gold wire is mentioned in the Bible in connection with a favourite of a Pharaoh who reigned in Egypt about 2750 B. C. but the wire of the ancients was probably produced by hammering and not by the process of "drawing" as practiced today.

✦ ✦ ✦

Early Wire Drawing

THE "drawing" of wire was mentioned in an old Latin manuscript of the 8th or 9th century; authentic records are available to show that wire drawing was practiced on a commercial scale in France in 1270, in Germany in 1350, in England in 1465 and in America in 1775.

✦ ✦ ✦

First "Patented" Wire

THE first tempered or "patented" steel wire was made in England in 1854; this advent was a revolutionary one and opened up the field of development of the high strength steel wire as made today; prior to this advent, the tensile strength was only 90,000 lbs. per square inch; today special improved plow steel wire will develop 280,000 lbs. per square inch.

✦ ✦ ✦

Origin of Designations of Rope Wire

THERE is a history back of the designations of the several grades of rope wire; **crucible cast steel wire** was so termed as the steel was made in small crucibles; **plow steel wire** was named from the service for which it was used in steam ploughing work, in which the service was considered as exceptionally severe and **Traction steel wire** was so named from its development for high-speed traction machine elevators.

Grades of Wire Rope

THERE are six standard grades of wire rope, made for varying services, these being shown in Table A, together with their physical properties:

TABLE A

	Tensile Strength Lbs. Per Sq. In.	Brinnell Hardness Number
Swedes Iron	**90,000**	**150**
Traction Steel	**170,000**	**280**
Crucible Cast Steel	**190,000**	**340**
Extra Strong Cast Steel	**210,000**	**360**
Best Plow Steel	**235,000**	**390**
Improved Plow Steel	**260,000**	**420**

Rope Wire

ROPE wire is a high carbon steel, the five grades above varying from 0.30 to 0.80% carbon, together with manganese, silicon, sulphur, phosphor, copper, etc.; all of which have an influence on the characteristics of the wire and the amounts of which are established by experience and research, so as to result in the most serviceable wire for a given requirement.

✦ ✦ ✦

Significance of Brinnell Hardness Number

THE Brinell hardness number is indicative of the abrasion and crushing resistance of the wire, as well as its tensile strength but regardless of whether the rope or sheave is harder, wear of both will occur in service; the hardness of the sheave and drum materials being as follows:

Material	Approx. Brinell Hardness Number
Cast Iron	**125**
Semi-Steel	**173**
Carbon Steel Casting	**260**

✦ ✦ ✦

RECENT wire rope research has indicated that the lower strength wire will better withstand bending stresses than the higher strength wires under certain conditions of operation.

✦ ✦ ✦

Grades of Steel

THE grade of steel has very little influence on the flexibility of the rope, as flexibility is a function of the construction and lay of the rope.

✦ ✦ ✦

THE question is occasionally raised, "Why do not the wire-rope manufacturers use alloy steel for wire ropes?" Some research work has been done with nickel, vanadium, molybdenum and stainless (chromium and nickel) steel wire ropes and some have shown considerable merit but the price of these alloy steels is relatively so high that they are not commercially practical for wire ropes.

✦ ✦ ✦

Construction and Lays of Rope

CONSTRUCTION of a wire rope pertains to the number of strands and the number and arrangement of the wires in the strands; for example, a 6x19 Filler Wire **Seale** rope describes a rope with 6 strands laid around a manila centre with each strand of 19 large wires and 6 small filler wires. The usual construction of wire ropes are shown in fig. 1.

✦ ✦ ✦

THE **lay** of a wire rope pertains to the combination of the lay of the wires in the strands and the strands in the rope and also the direction of the lay; the latter in the sense of the threads of a screw.

✦ ✦ ✦

REGULAR **lay** ropes are those having the exterior wires of the rope run parallel with the longitudinal axis of the rope.

✦ ✦ ✦

LANG **lay** ropes are those in which the exterior wires of the rope run diagonally across the longitudinal axis of the rope.

✦ ✦ ✦

Properties of Wire Ropes

A WIRE rope possesses certain physical and operating prop-

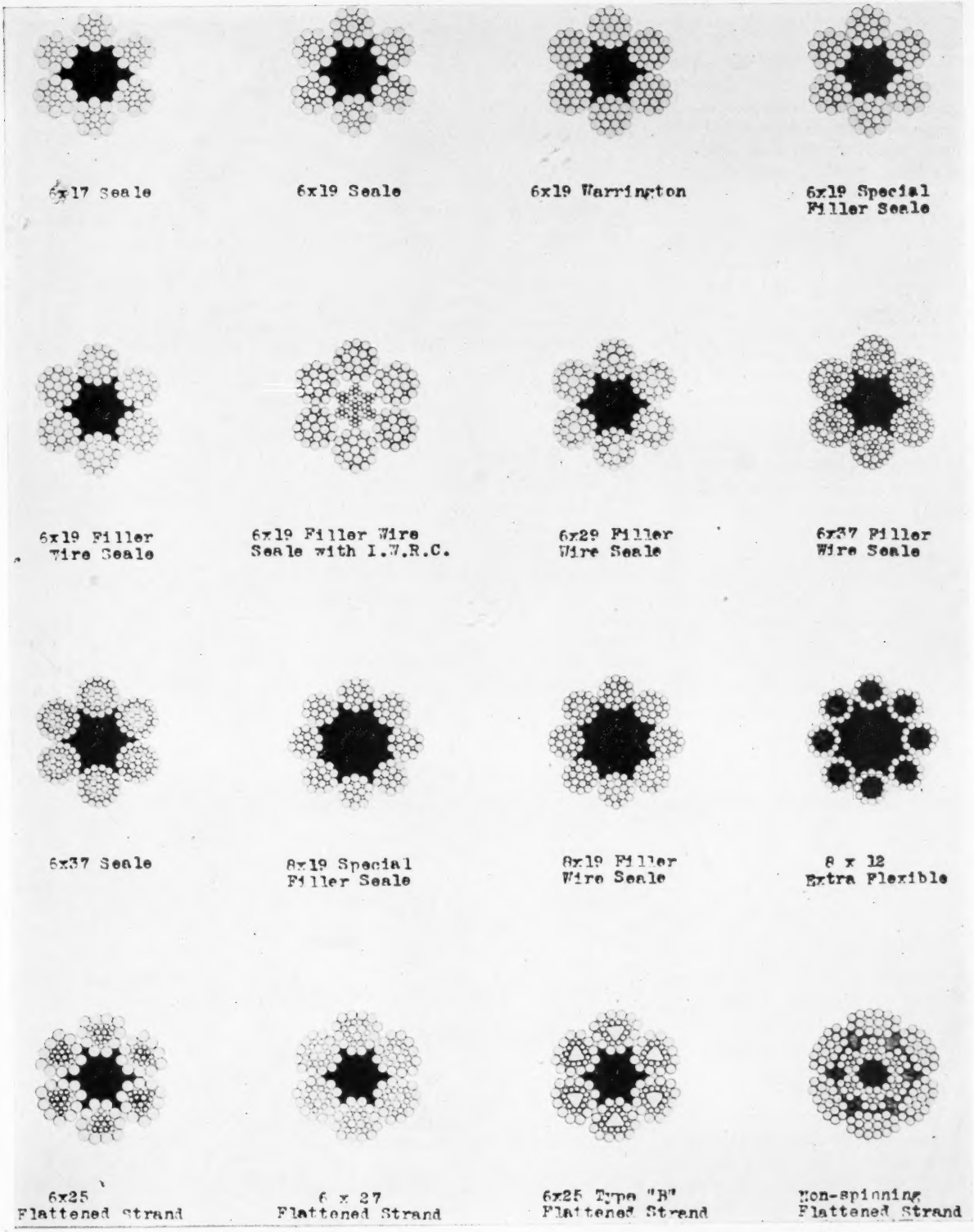

Fig. 1—Construction of Wire Rope.

erties, as its tensile and reserve strengths, resistance to bending, abrasion, crushing and shock loads.

Tensile Strengths

THE tensile or breaking strengths of wire ropes are given in the manufacturers' lists; these strengths are lower than the aggregate strengths of the wires in the rope as there is a loss in

strength due to the laying up of the wires in the strands and the strands in the rope; this loss ranges from 8 to 25% depending upon the construction of the rope and the length of the strand and rope lays and it may be calculated from formulae (3) and (4) on plate 110. (See page 211).

✦ ✦ ✦

THE reserve or remaining strength of a wire rope is the strength of the inner wires of the strands, granting that corrosion has not affected same, as the outer wires are subject to deterioration from breakage and abrasion; the reserve strengths vary from 18% for a 6x7 rope to 58% for a 6x37 rope and the value of same may be determined from formulae (3) and (4) on Plate 110 and it will be seen from these formulae that the strength value of a wire in a wire rope is a function of the length of lays as well as of the metalic area of same.

✦ ✦ ✦

The Bending Stresses

THE bending stresses in a wire rope are not susceptible to accurate mathematical analysis, as too many variables are involved; as an example, of three different types of 6x19 rope, each with 12 outer wires in the strands, research work has shown that there is a variance in bending life of 3 to 1 and a poorly proportioned rope or one with an undersize manila centre will show even a greater variation. Many theories have been evolved, some quite elaborate, for the determination of the bending stresses in wire ropes but the practical limitations of the problem have been neglected in the maze of the mathematics of the problem.

✦ ✦ ✦

A MISCONCEPTION exists concerning the bending stresses in a wire rope, in that it is considered that a rope bent over a sheave with a 90° arc of contact, is stressed less than when the rope is bent over an arc of contact of 180°. It is an established fact that the maximum bending stress is induced in a wire rope when the length of one rope lay is in contact with the sheave, regardless of whether the arc of contact is 45° or 180°. An arc of contact in excess of one rope lay simply induces the maximum bending stress in a longer section of the rope at that particular instant.

✦ ✦ ✦

Abrasion or Wear

ABRASION or wear of a wire rope may be caused by dragging the rope over the ground, etc.; by operating over sheaves and drums; by piling of the rope in multiple layers on the drum or by improper alignment of the sheaves and drum; if the proper differentation is made between these factors, the proper selection of a suitable wire rope is not difficult.

✦ ✦ ✦

WIRE ropes wound in multiple layers on small drums under heavy tension or badly wound on plain face drums, will crush out of shape and this crushing is often accompanied with tearing of the individual wires of the rope. The more rugged types of rope, as a 6x19 **Seale**, will better withstand this abuse than the standard 6x19 rope and where flexibility is a requisite, an independent wire rope centre must be used in the rope instead of a manila centre.

✦ ✦ ✦

Other Physical Properties

THERE are other physical properties of wire rope that must be considered; one is the untwisting or spinning action of a new wire rope which is caused by the rope stretching under tension; this action is noted here as it must be guarded against in a **Lang** lay rope, as otherwise the outer wires of the rope will open out or "birdcage" badly.

✦ ✦ ✦

Specific Advantages of Different Types

LANG lay wire ropes offer the advantage of increased bending and wearing properties but require that the untwisting action be controlled and care be used during installation and that all grooves of sheaves and drums properly seat the rope.

FLATTENED Strand wire ropes offer greater tensile strength, 8 to 15%; increased wearing surface and greater resistance to crushing than corresponding round strand ropes.

✦ ✦ ✦

TRU-LAY preformed wire rope, with its increased bending, wearing, crushing and non-kinking properties, has proven an economy rope for many purposes and its ease of handling and installing should be considered too when some hesitancy is felt on account of its initial higher price and, finally, don't take too seriously the loose sales talk regarding the breaking of the outer wires of the strands of the rope next to the manila centre in a Tru-lay rope, as other ropes will show the same characteristic under certain conditions of loading and bending operations.

✦ ✦ ✦

Elevator Wire Ropes

THE development of hoist ropes for the modern high speed traction elevator has been a matter of evolution; initially 6x19 ropes of various constructions were used in an endeavour to secure a satisfactory rope; some years ago an 8x19 **Seale** rope was offered to the trade for this service; it was ridiculed by competitors but it has proven its merit and the 8x19 rope is practically the standard rope for the service today; **Tru-lay** elevator ropes were and are still subject to the same kind of ridicule but after a decade of usage, it is winning a deserved place in the elevator trade.

✦ ✦ ✦

APPROXIMATELY 90% of the elevator ropes we make are 8x19 construction, these for the hoisting, governor and compensating cables. We developed recently an 8x12 **Swedes Iron** rope with 9 hemp centres for hand or shipper ropes, valve operating ropes on hydraulic elevators and for gate ropes on freight elevators; this 8x12 rope is equally as flexible as the old 6x42 Iron Tiller ropes and

offers the advantages of lower price, less stretch and greater wearing life than the tiller rope.

✦ ✦ ✦

SAFETY is the paramount consideration of elevator operation and as the hoisting medium, the safety of the wire ropes is of utmost importance; more particularly ropes that have been in service awhile and show signs of deterioration by worn and broken wires.

✦ ✦ ✦

IT may be a surprise to some engineers that there are no definite rules upon which elevator ropes are condemned; broken or worn wires or a combination of both are taken into consideration but frequently wire ropes are condemned before necessary, as with no definite data pertaining to the structural details of the rope, the inspector is inclined to be on the safe side and quite properly too.

✦ ✦ ✦

SUGGESTIONS for the discarding of elevator hoist ropes together with chart for determining the remaining strengths of ropes in service were given in an article by the writer entitled "The Safety of Wire Ropes for Elevators" as published in "The Building Superintendent" (Montreal); reprints of this article are available for distribution to those interested in the subject.

✦ ✦ ✦

Shop Crane Ropes

ON overhead shop cranes and small electric and pneumatic hoists, 6x37 ropes are generally used as the drums and block sheaves are comparatively small, though 8x19 and 6x19 ropes are occasionally used with satisfactory results.

✦ ✦ ✦

CARE must be exercised in the usage of 6x19 crane ropes; the minimum drum and sheave diameters should be 30 rope diameters and the equalizing sheave 16 rope diameters; quite often the latter consideration is overlooked; however, for ropes ½" diameter and larger, the most satisfactory crane rope is the 6x37 rope as it offers the following advantages over the 6x19 rope:

(1) — Greater flexibility and bending life.

(2)—Greater wearing life, as the lower unit radial pressure of rope in the groove of the sheave results in a retardation of wear of both the rope and the sheave.

(3)—Greater safety, as the reserve or remaining strength of a 6x37 rope is at least 15% greater than that of a 6x19 rope.

✦ ✦ ✦

ROPES on hot metal ladle cranes are subject to considerable heat, which often is sufficient to char the manila centre in the rope, resulting in greatly reduced rope service; such crane ropes should be made with an independent wire rope centre (I.W.R.C.) Such steel centre ropes should be stretched out on the floor before reeving on the crane, so as to relieve the rope of any inherent crankiness, otherwise the rope may "bird-cage" close to the equalizing sheaves after being in service for a short time.

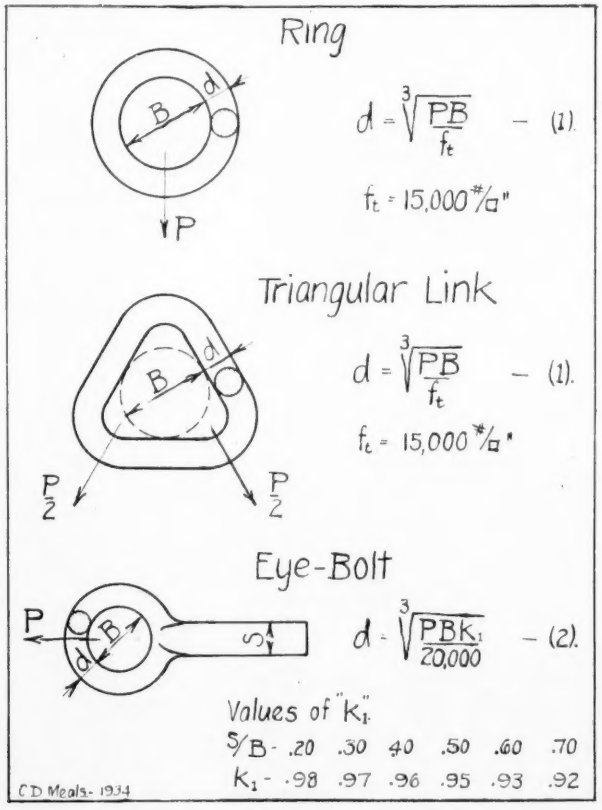
Ring
$d = \sqrt[3]{\frac{PB}{f_t}}$ — (1).
f_t = 15,000 #/□"
Triangular Link
$d = \sqrt[3]{\frac{PB}{f_t}}$ — (1).
f_t = 15,000 #/□"
Eye-Bolt
$d = \sqrt[3]{\frac{PBK_1}{20{,}000}}$ — (2).
Values of "K_1"
S/B - .20 .30 .40 .50 .60 .70
K_1 - .98 .97 .96 .95 .93 .92
C.D. Meals - 1934

Fig. 106.

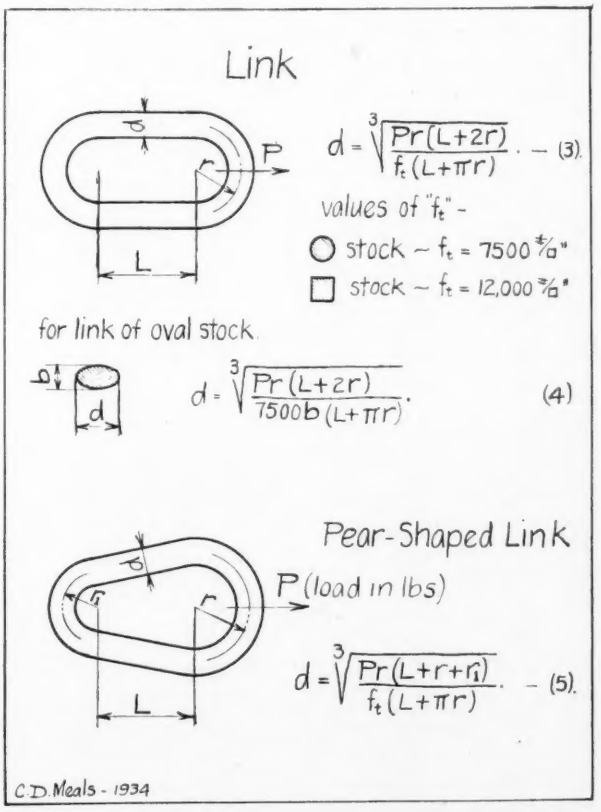
Link
$d = \sqrt[3]{\frac{Pr(L+2r)}{f_t(L+\pi r)}}$ — (3).
values of "f_t" -
stock — f_t = 7500 #/□"
stock — f_t = 12,000 #/□"
for link of oval stock.
$d = \sqrt[3]{\frac{Pr(L+2r)}{7500b(L+\pi r)}}$. (4)
Pear-Shaped Link
P (load in lbs)
$d = \sqrt[3]{\frac{Pr(L+r+r_1)}{f_t(L+\pi r)}}$ — (5).
C.D. Meals - 1934

Fig. 107.

FOR ropes on cranes and small hoists subject to acid or acid fumes, specially lubricated steel ropes may be used and will be found more economical than monel metal ropes and possibly as economical as stainless steel ropes.

✦ ✦ ✦

REGARDING the discarding of crane and small hoist ropes, the suggestions shown in Table B are offered.

Derrick, Crawler and Locomotive Crane Ropes

WIRE ropes for these equipment are usually subjected to severe operating conditions; the drums and sheaves are small, the ropes wind and pile up badly on the drums; reverse bends are not unusual and where grab buckets are used, the closing line is often subjected to severe bending stresses and excessive abrasion.

IN the selection of the best type of ropes to use for this equipment, it must be decided which is the worst of the two operating conditions, whether on the drum or in the grab-bucket. Generally, the 6x19 Filler Wire Seale Green Strand Tru-lay ropes with either a manila centre or an I.W.R.C. are used and sometimes an 8x19 or a 6x37 Tru-lay rope.

✦ ✦ ✦

FOR derricks with a single part hoist line, a 6x19 rope will rotate excessively unless the skip or bucket is equipped with a tag-line; if a tag-line is impractical, a non-spinning rope must be used; for moderate service an 18x7 Tru-lay rope may be used but where the operating conditions are severe, the more rugged type of Flattened Strand Non-spinning rope should be used.

✦ ✦ ✦

WHERE a grab-bucket is used on a deep hoist, the use of a Right lay closing line and a Left lay holding line will eliminate rotation of the bucket.

TABLE B

(a)—Crane and small hoist ropes shall be discarded when the number of broken outer wires in a rope within a length of one rope lay exceeds the following values:

TABLE 1—DISCARDING OF CRANE ROPES

Rope	Total Wires broken in one rope lay	No. of adjacent wires broken in any one strand
6x37 Seale	24	6
6x37	30	8
6x19	16	5
8x19	24	6

(b)—When the outer wires are worn to 2/3 of their original diameter.

(c)—When the loss of area exceeds 15% for combined broken and worn wires.

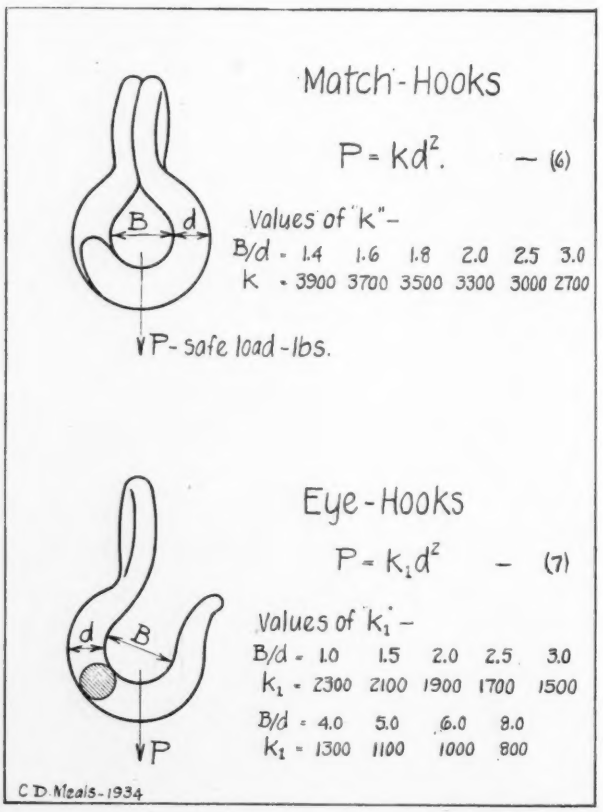

Fig. 108.

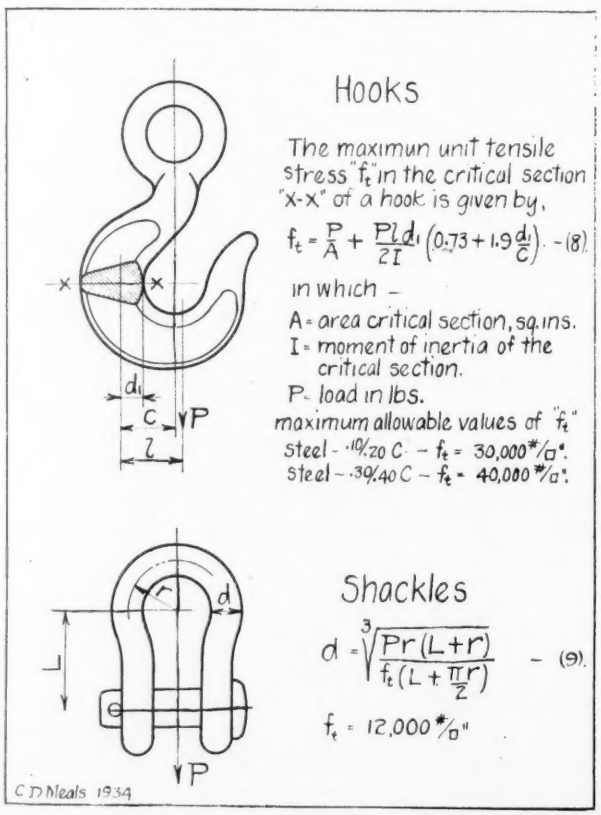
Hooks
The maximun unit tensile stress "f_t" in the critical section "X-X" of a hook is given by,
f_t = P/A + (Pl d₁/2I)(0.73 + 1.9 d₁/C). - (8)
in which -
A = area critical section, sq. ins.
I = moment of inertia of the critical section.
P = load in lbs.
maximum allowable values of "f_t"
steel - .10/.20 C - f_t = 30,000 #/□".
steel - .30/.40 C - f_t = 40,000 #/□".
X
d₁
C
l
P
Shackles
d = ∛(Pr(L+r) / f_t(L + πr/2)) — (9).
f_t = 12,000 #/□"
r
d
L
P
C D Meals 1934

Fig. 109.

Shovel And Excavator Ropes

THE hoist, thrust and crowd lines on shovels are subjected to severe shock loads and excessive tensile and bending stresses and as these ropes operate over relatively small drums and sheaves, the radial pressures of the rope in the groove of the sheaves are too high for a manila centre to withstand and consequently a rope with an I.W.R.C. is a requisite. 6x19 and 6x37 Green Strand Tru-lay ropes with I.W.R.C. are generally used although for some types of shovels on which the ropes are subjected to reverse bends, an 8x19 Green Strand Tru-lay rope is preferable.

✦ ✦ ✦

THE draglines on excavators are subjected to both severe abrasion and crushing on the drums and for these ropes the 6x19 Green Strand Lang lay Tru-lay rope with an I.W.R.C. or a 6x25 Type "B" Flattened Strand Green Strand rope are the most satisfactory.

✦ ✦ ✦

FOR the dragline and tail rope on drag-scrapers, such as used in sand and gravel pits, the ropes are subjected to severe abrasion and piling up on the drums and the 6x19 Seale Best Plow Steel Tru-lay ropes have proven the most satisfactory for the service.

✦ ✦ ✦

Sheaves And Drums

ADMITTEDLY, drums and sheaves are small for satisfactory rope service; power and space limitations set a limit to their diameters and consequently there results rapid wear of both the rope and the sheave equipment. It is therefore of utmost importance that drums and sheaves be maintained in first-class condition if comparatively satisfactory rope service is to be secured.

WORN or corrugated grooves of a sheave indicate excessive radial pressures and it may be corrected by:

(a) increasing the diameter of the sheave.

(b) using a harder or more abrasion-resisting material, as manganese steel instead of cast-iron.

(c) use a flattened strand rope and

(d) keep the rope thoroughly lubricated.

✦ ✦ ✦

TIGHT grooves in sheaves that wedge or pinch the rope prevent the unrestricted wire and strand movement so necessary to give the least resistance to bending and consequently subjecting the rope to increased bending stresses, causing premature breaking of the wires of the rope. Tight grooves displace the strands of the rope, reducing the original efficiency and equilibrium of the rope and also prevent free rotation of a new rope and thus increases the wear on the wires. Corrugated grooves of sheaves are equally detrimental to satisfactory rope service.

✦ ✦ ✦

IMPROPERLY aligned sheaves result in abnormal wear of both the rope and the sheaves. Any arrangement of sheaves subjecting the rope to reverse bends should be avoided if possible, as such reevings of the rope materially reduces its life, in some cases as much as 50%.

✦ ✦ ✦

TOO small a sheave will cause excessive internal stresses within the rope and the "critical" tread diameters of sheaves and drums for this condition for the various constructions of rope are given in table C, as well as the advisable "minimum" diameters of sheaves; any increase over the latter values will be an economy in both the rope and the sheaves.

✦ ✦ ✦

THESE sheave proportions are for slow speed rope service and where safety is not paramount; for high speed rope operation and where safety is a consideration, sheaves larger than the "minimum" diameters should be used.

✦ ✦ ✦

WHEN examining wire ropes in which the bight or centre of the rope passes over equalizing or compensating sheaves, as in boomlines of crawler and locomotive cranes, shovels, excavators, shop cranes, etc.; it is well to remember that the "unseen danger section" of these ropes is the underside part passing around such sheaves as there is a slight creep of the rope due to the variation in stresses in the rope and broken and worn wires result.

✦ ✦ ✦

Lubrication of Wire Rope

A WIRE rope operating over sheaves and drums is a machine, with many moving parts and

Strength of Wire Rope and Strand.

Wire Strand

The breaking strength of a strand, "T_s" in terms of the individual wire strengths "S" is given by

$$T_s = \sum_1^n S \cos^3 \alpha. \quad - (1)$$

which for a 1 x 19 strand becomes

$$T_s = S + 6 S_1 \cos^3 \alpha_1 + 12 S_2 \cos^3 \alpha_2. \quad - (2)$$

Wire Rope

The breaking strength "T_r" of a wire rope in terms of the number of strands "N" and of the wire strengths "S", is,

$$T_r = N \cos \beta \sum_1^n S \cos^3 \alpha. \quad - (3)$$

which for a 6 x 19 wire rope becomes

$$T_r = 6 \cos \beta \left[S + 6 S_1 \cos^3 \alpha_1 + 12 S_2 \cos^3 \alpha_2 \right] \quad - (4)$$

C D Meals - 1934

Fig. 110.

TABLE C—MINIMUM SHEAVE DIAMETERS
in terms of Sheave rope diameter

Rope	6x19 Seale	6x19 Spec. Filler Seale	6x19 Filler Wire Seale	6x37	8x19	Flat-tened 6x25	Strand 6x27
Critical	22	20	18	14	16	24	21
Minimum	30	27	24	18	22	32	28

For the sheave diameters given in table 2, the factor of safety on the rope should be 6 as a minimum.

TABLE D—EFFICIENCY OF FITTINGS

Sockets—properly made with zinc with wires left straight	100%
improperly made with babbitt metal, lead, etc., and with wires bent back	50-80%
Wedge Sockets	70%
Clips—properly attached with all "U"-bolts on the short end of the rope	80%
Staggering "U"-bolts	75%
Eureka Clips	85%
Knot and Clip Fastening	50%
Spliced eye or loop varying with diameter and stiffness of rope and with workmanship of the splice	70-95%
Endless splice in rope	80%

TABLE E

Diam. rope —	¼"	⅜"	½"	⅝"	¾"	8"	1"	1⅛"	1¼"	1½"
No. Clips —	2	2	3	3	4		4	4	5	5

FORMULAE for the design of rings, links, eye-bolts, hooks and shackles are given on plates 106, 107, 108 and 109; these are all based from formulae derived from the "Theory of Stresses in Curved Beams"; simplified for practical application and correspond to data published tentatively in Dec. 1932 by the American Standards Association for "Safety Code for Cranes, Derricks and Hoists"—of which code committee the writer is a member and which data was originally submitted by him to the committee.

wearing surfaces; accordingly it must be lubricated if satisfactory rope service is to be maintained. Varying conditions of service require different kinds of lubrication.

✦ ✦ ✦

PROPER lubrication retards corrosion and rotting of the manila centre, reduces friction between the component parts of the rope and decreases external wear of the rope as well as of the other equipment. Lubrication is a safety measure too, as corrosion embrittles steel, greatly reducing its tensile and fatigue-resisting properties.

✦ ✦ ✦

Fittings For Wire Ropes

SATISFACTORY wire rope service and safety too, is often dependent upon properly designed and attached fittings on the ends of the rope. The efficiency of fittings on the ends of ropes are approximately as given in table D.

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IN elevator rope practice, there is a controversy regarding the merits of socketed and clipped attachments; there is no need of such a controversy as both attachments are satisfactory; for obvious reasons, the writer prefers the clipped attachment and preferably with the Eureka Clips.

✦ ✦ ✦

THE number of clips required for an eye or loop attachment in the end of a wire rope, for the different diameters of ropes are as shown in Table E.

All Wire Mill Men Are Invited To Attend

The Wire Association 1934 Meeting and Exhibition

✦ ✦ ✦

At New York, N. Y., October 1 to 5 inclusive

✦ ✦ ✦

REDUCED RATE RETURN TRIP RAILROAD CERTIFICATES
FURNISHED TO MEMBERS OF THE WIRE ASSOCIATION

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FOR DETAILED INFORMATION ADDRESS
RICHARD E. BROWN, SECRETARY
THE WIRE ASSOCIATION 17 EAST 42ND ST., NEW YORK, N. Y.

Wire Drawing At The Higher Speeds

By J. B. Nealey

American Gas Association

The application of high speed machines to the drawing of fine wire through the adaptation of a multi-die system has been developed to a high degree by the Belden Manufacturing Company. A condensed description of their methods is given here.

IN these modern times great industries are built on small things. Fine wire is one, insulated cords another and electric plugs a third. The manufacture of these three items is now combined in the plants of the Belden Manufacturing Company, Chicago, Illinois. This concern conceived the now world-famed soft rubber plug, the outstanding development in this industry in a great many years.

✦ ✦ ✦

The Plants

THE Belden Manufacturing Company has two plants, one in Chicago and one in Richmond, Indiana. The Chicago plant is housed in a huge modern building and here is drawn wire of all finesses, which is then made into magnet wire and into conductors which are used in the Richmond plant to make rubber covered wire and rubber plug cords. This concern supplies wire to every industry that uses the gauges made.

✦ ✦ ✦

Raw Materials

RAW material comes in the form of 5/16 in. copper rod in coils and this is drawn down to the finer sizes in modern mills as follows:

1.	Rod mill	5/16"—15 ga.
2.	Intermediate machines	16 ga.—26 ga.
3.	Fine machines	27 ga.—46 ga.

✦ ✦ ✦

Wire Drawing

THE product of the rod mill is drawn in multi-die, progressive wire drawing machines equipped with 5 to 9 dies each. Speed of drawing has been increased right along in recent years until 6,000 ft. a minute is now easily accomplished while at this plant much higher speeds have been experimented with. Alloy steel dies are used for the larger gauges and diamond dies for the finer gauges and for finishing. The care with which these dies are designed and made is of tremendous importance in attaining high speed drawing.

✦ ✦ ✦

THE design of the modern drawing machine is a radical departure from the old time bench and straight roll methods. The modern step cone rolls with from 13 to 16 dies, all compacted in a small space and enveloped in a light steel case to permit constant and liberal lubrication is now standard practice. An upright steel base holds the dies and the wire loops back and forth on two step cone roll series one or either side. The step cone rolls reduce slippage, due to the gradual lengthening of the wire, to a minimum. Each time the wire passes through a die its length is increased, the linear travel of the wire is increased and either the size or speed of the next roll must be increased to take up this extra length. In order to make one shaft and one motor do for one set of rolls their size is stepped up instead of their speed.

Fig. 1—Row of high speed multi-die progressive wire drawing machines with covers off to show dies, step cone rolls, etc. Some of these units will draw 6000 ft. of wire per minute. ✦ ✦

Speeds And Slippage

THE perfect machine would have no slippage whatever. Theoretically the difference in lineal speed between gauges is 26%, but in a practical machine somewhat less is allowed for to in part compensate for variations in die diameter and roll size. In this plant there are countless batteries of these wire drawing machines which operate at such great speeds that they are partially submerged in lubricating solutions and these lubricants are constantly sprayed onto the exposed sections. An operator with a gas torch brazes one spool of wire to another, as the machines use it up, so as to obviate the necessity of re-threading the dies.

Fig. 2—Annealing furnaces showing wire being loaded onto submerging platform. Fired with gas.

✦ ✦ ✦

Annealing

ANNEALING is accomplished in insulated cylindrical steel furnaces, heated with gas burners and filled with a non-oxidizing atmosphere in the form of steam. These furnaces are each 7 ft. high and 4 ft. in dia. and inverted over a tank of water, the water level rising just above the lower edge so as to form an air seal. Located in this tank is an hydraulic lift, with an arm and circular platform of the same diameter as the furnace. The platform is swung around and raised to a hole in the floor, just in front of the furnace, loaded with spools of wire, submerged, swung around through a half circle and raised so that the wire is inside the furnace. Four gas burners fire into the furnace from opposite sides and close to the bottom. The steam is forced in at the top.

Fig. 3—Tinning wire. One of the gas fired tin pots with a setup of spools at one end and motor driven reels at the other. The latter pull the wire through the molten tin and rewind it.

✦ ✦ ✦

Drying

WIRE that is not annealed is dried in an insulated steel oven 12 ft. long and 4 ft. in cross section, which is provided with a separate gas-fired heater. Spools of wire on steel racks handled by lift trucks are charged into this dryer through a series of steel doors in one side. The heater is of the drum type, with a single gas burner in one end. The hot products of combustion are forced out at the other end, through a flue into the dryer, and after they circulate through the dryer they are sucked back into the heater where they are reheated for recirculation. There is an automatic temperature control actuating a motor valve in the gas supply line.

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Tinning

FOR wire to be tinned, there are long rows of gas-fired tin pots with fixtures for holding spools and motor driven reels for rewinding. In this manner the wire from 9 or 10 spools is pulled automatically through the molten tin. On the entering side of the pots, however, is an acid bath through which the wire must first pass while on the other is a tank of cold water for cooling the wire prior to rewinding. These tin pots are about 12 in. deep, 18 in. wide and 3 ft. long and each is heated with a number of gas burners. The operation is carried on at a high rate of speed.

✦ ✦ ✦

Enameling

WIRE enameling is accomplished in long rows of automatic machines and the product of this division of the works is probably the best enameled wire in the world. Each machine consists of a tank of enamel and two sets of pulleys, one in the bottom of the tank and

the other from 5 to 12 ft. above, according to the size of the wire. The number of pulleys depends upon the number of coats the wire is to receive and the number of wires to a machine. The wires running vertically between the pulleys are enclosed in a steel case which forms a baking oven and is heated by gas burners.

✦ ✦ ✦

SUCCESSIVE coats, depending on the number of passes, are thus put on and baked on, and the enameled wire rewound on spools continuously and automatically. Waste heat from the baking ovens is exhausted through a stack in the top.

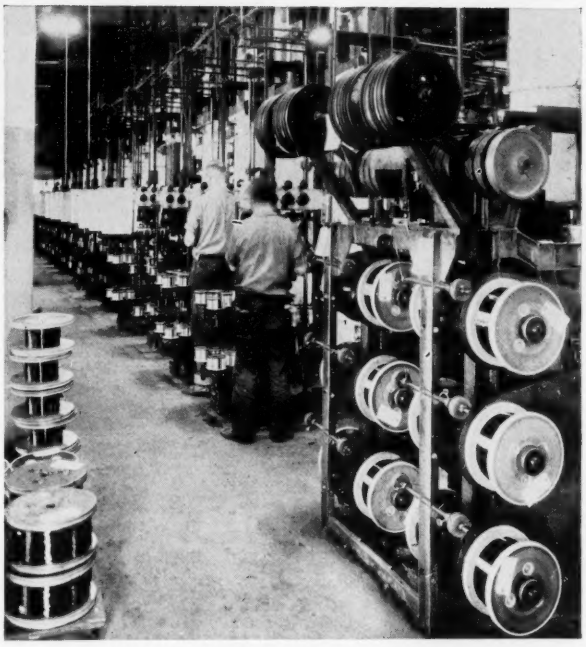

Fig. 4—One of the many rows of wire enameling machines and vertical gas fired dryers. The wire is pulled through tanks of liquid enamel, travels up and down through the oven where it is dried on and then out where it is rewound onto spools, continuously and mechanically. ✦ ✦

✦ ✦ ✦

Silk And Cotton Covering

THE silk and cotton covering division is provided with long lines of machines for performing this operation automatically, continuously and at a high rate of speed. Spools of cotton or silk, as many as there are thicknesses of covering to go on, are held in fixtures, one above the other. The wire passes from below up through the centers of these spools and as it passes a rapidly rotating arm wraps the thread around it tightly. There are other types of winders but the principle is the same.

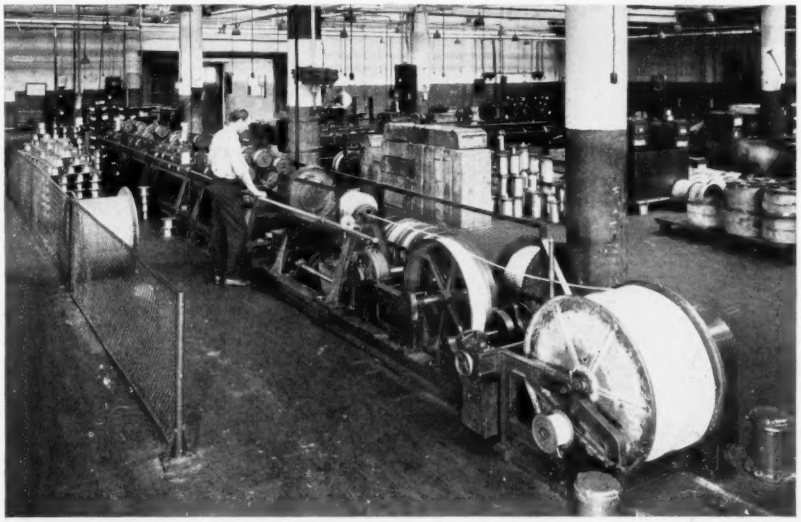

Fig. 5—Wire stranding unit (a concentric cabler). ✦ ✦ ✦ ✦ ✦

✦ ✦ ✦

THERE is a huge stranding or cabling division where numbers of bare or tinned copper wires are stranded together into flexible conductors which are then cotton, silk or rubber covered. These stranding machines are of the conventional type with refinements added here and there. The cable for the automobile starter, as made here, contains 127 separate wires, and necessitates the use of a rather complicated stranding machine.

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Gas Fired Heating

PROCESS steam and steam for heating the plant is obtained from two separate boilers. These boilers are fired with gas burners and are automatic and continuous in operation. This is accomplished through a steam pressure control by which the fuel flow to the burners is shut off when the steam pressure rises above the point set on the indicator, and is restored when it drops back again. With an automatic water feed these boilers require no attention whatever.

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TAKEN all in all, it would indeed be difficult to find a plant of this type so completely equipped with the modern and up-to-date machines, furnaces, ovens, etc., as is this plant.

Make your plans now to attend the - -
Wire Association Meeting at New York, October 1-5, 1934

For Information Address Richard E. Brown, Secretary

The Wire Association 17 East 42nd St., New York, N. Y.

Wire Association Plans for 1934 Annual Meeting

New board of directors elected --- changes in By-Laws --- plans for annual meeting and general information for those planning to attend.

AS a result of the recent directors meeting of the Wire Association held at the Hotel New Yorker, New York, N. Y., on April 27th at which time a nominating committee for directors to fill the present expirations was named, a mail vote was taken on the names submitted and the following new directors elected:

Paul R. Fast,
Superintendent, Belden Manufacturing Co., Chicago, Ill.

M. A. Kent,
Assistant General Works Mgr., General Cable Corp., White Plains, N. Y.

Frederick A. Westphal,
Superintendent, Wire Department, Sheffield Steel Co., Kansas City, Mo.

✦ ✦ ✦

WITH the inclusion of these directors the Board of Directors of the Wire Association now consists of the following:

C. S. Barningham,
Sales Mgr., New England Butt Co., Providence, R. I.

R. E. Brown,
Publisher, WIRE AND WIRE PRODUCTS, 17 East 42nd St., New York, N. Y.

John C. Callaghan,
Works Mgr., Canada Works, Steel Co. of Canada, Ltd., Hamilton, Ontario, Canada.

E. W. Clark,
Managing Engineer, Wire Dept., General Electric Co., Schenectady, N. Y.

Ralph K. Clifford,
General Supt., Continental Steel Corp., Kokomo, Ind.

Paul R. Fast,
Superintendent, Belden Manufacturing Co., Chicago, Ill.

L. D. Granger,
Asst. to Vice-President, Wickwire Spencer Steel Co., 41 East 42nd St., New York, N. Y.

E. P. Kastien,
Purchasing Agent, Keystone Steel & Wire Co., Peoria, Ill.

M. A. Kent,
Asst. General Works Mgr., General Cable Corp., White Plains, N. Y.

Kenneth B. Lewis,
Consulting Engineer, 43 Midland St., Worcester, Mass.

John Mordica,
Superintendent, Rod & Wire Works, Bethlehem Steel Co., Sparrows Point, Md.

W. D. Pierson,
Secretary, Waterbury Farrel Fdry. & Machine Co., Waterbury, Conn.

J. C. Ward, Jr.,
The Rome Co. Inc., Rome, N. Y.

Frederick A. Westphal,
Superintendent, Wire Department, Sheffield Steel Co., Kansas City, Mo.

✦ ✦ ✦

Change Made in By-Laws

AT this meeting it was the expressed desire of the directors present to re-elect John Mordica, Superintendent, Rod & Wire Works, Bethlehem Steel Company, Sparrows Point, Md., as President of the Association for an additional year. It was found, however, that under the existing By Laws of the Association this could not be done and it was voted accordingly to submit a change in the By-Laws to the membership of the Association in order to permit this action.

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AS a result of the mail vote taken in accordance with this decision, the following change has been made in the By Laws: Article 5, Section 7, which read as follows:

"No persons shall serve as President for more than two consecutive years and no more than one person representing the same firm or corporation shall serve as an officer of the Association during any one year."

This has now been changed to read as follows:

"No more than one person representing the same firm or corporation shall serve as an officer of the Association during any one year."

✦ ✦ ✦

THIS change will permit the re-election of the present President of the Association for another year.

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THE nominating committee for officers for the coming year has been selected and it is expected that the Board of Directors will elect the new officers of the Association some time within the next thirty days.

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Plan For Annual Meeting to be Held in October at New York

THE plans for the annual Wire Association meeting to be held at New York, N. Y., October 1 to 5 inclusive are proceeding well and program committee reports that

papers will be submitted by the following:

D. Horsfall,
Works Manager, Canada Wire & Cable Co. Ltd., Toronto, Canada.

Allan B. Dove,
Chemical Engineer, Steel Company of Canada, Ltd., Hamilton, Canada.

U. C. Tainton,
Consulting Metallurgist and Research Metallurgist for Bethlehem Steel Company.

E. J. P. Fisher,
Physical Metallurgist, Keystone Steel & Wire Co., Peoria, Ill.

O. S. Haskill,
Industrial Heating Engineer, General Electric Co., Schenectady, N. Y.

W. S. Adams,
Supt. Rolling Mills, and Mr. Miller, Supt. of Furnace Refinery, Anaconda Copper Mining Co., Great Falls, Montana.

John G. Richards,
Lubricating Engineer, G. Whitfield Richards, Philadelphia, Pa.

Registration Fee to be Continued

IT was unanimously voted to continue the registration fee of $5.00 for those in attendance at the meeting and it was particularly desired to call attention to the fact that this registration fee applies to both members and guests.

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Prices for Copies of Proceedings

HERETOFORE copies of the proceedings have been available at a cost of $2.50 to all who desired them irrespective of whether or not they attended the meetings.

The directors voted to change this practice and to fix the price of $2.50 for copies of the proceedings for those who attend the meeting and who pay the registration fees. To all others a charge of $5.00 per copy will be made for proceedings.

It was found necessary to do this because of the cost involved in preparing and distributing these proceedings.

Association Headquarters

THE headquarters of The Wire Association for the Convention will be at the Hotel New Yorker, 8th Avenue and 34th Street, New York, N. Y., and the National Metal Exposition will be held at Commerce Hall in the Port of Authority Building, 15th Street and 8th Avenue.

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Registration

REGISTRATION will be required for all of those attending The Wire Association meetings and admission to the meetings and to the informal gatherings held in the Wire Association headquarters during the convention will be confined exclusively to those who register and obtain identification badges.

✦ ✦ ✦

ADMISSION to the National Metal Exposition will be by ticket which may be obtained from the Secretary of The Wire Association by those desiring to attend.

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No. 237
Electric Resistance Pointers, Capacity .148

No. 282
Waterbury No. 1 Straight Roll Machines, With Spooling Attachment.

No. 302
9 Die Richards Continuous Machine For Copper Rod

Waterbury stand spooler for fine wire.

No. 321
Electric Platform Truck
Capacity 6000 lbs.
Platform 41″ x 82″ x 22½″ High
24 Cells Edison A-6 Batteries

No. 342
Nilson Power Press B 2

No. 400
Twenty head enameling machine complete, capacity down to .001.

No. 401
Eight head spooler, capacity 200 lb. spools, motor driven.

No. 402
Hayes electric furnaces, automatic control, with 32 head spooler, for fine wire.

No. 403
Waterbury straight roll fine wire machines, motor and belt drive.

No. 406
Die Reaming Lathe, Semi-automatic.

No. 408
Barron and Crowther 3 hole continuous wire machines, ranges from No. 5 rod to 21 gauge.

No. 409
Wire pointers for bench or post mounting, ¼ to No. 12.

No. 417
12 block fine frame.

No. 418
Five 4-penny nail machines (German design)

No. 432
24 block intermediate frame with 16″ blocks, reducer, and pulley drive.

WE HAVE BUYERS FOR THE FOLLOWING

No. 270
Tinning Equipment For Fine Wire.

No. 292
Wanted
Automatic Four Slide Forming Machines

No. 301
No. 19 Wire Tubular Stranding Machine for 200 to 400 lb. bobbins, also Spooler for same.

No. 339
Straightening & Cutting Machines,
½″ Capacity, 20 ft. Lengths.

No. 360
Wanted
No. 1 Tor and No. 1 Universal and No. 3 Universal Sleeper & Hartley Coilers.

No. 381
Die Reaming Lathe.

No. 382
Rivet Machines No. 0 or No. 1 Waterbury or Manville.

No. 383
Waterbury Cone Machines.

No. 384
Florist Wire Machines.

No. 410
Barb fence machines in good condition, 2 and 4 point.

No. 411
A 5-keg nail tumbler.

No. 412
Tensile testing machine for low carbon wires No. 5 to No. 25 gauge.

No. 413
U. S. S. M. Power Eyeletting machines, type B.

No. 414
Two take-ups. 60″ reel by 32″ traverse, with jacks, and chain drive from capstan shaft, also two let-off stands, and 36 x 8 capstans with spur drive.

No. 415
Paper wrapping machine, coils 16″ to 22″, 100 lb. weight, Terkelsen 1C or equivalent.

No. 416
Small riveting machines, Townsend No. 1 or equivalent.

No. 419
Single spooler, 6½ x 6½ for No. 20 hard basic.

No. 420
4 block rod bench, 22″ or 24″.

No. 421
Fifteen frames, 16″ blocks.

No. 422
Morgan-Connor machines, 4 hole heavy type.

No. 423
Automatic roll feed for press, 2″ stroke, stock 3″ x 1/16″.

No. 424
Steam jib crane 18 ft. radius.

No. 425
Lewis-Shepard lift trucks, about 45 x 20, height 6″.

No. 426
Loom for brass, copper and bronze, 100 mesh.

No. 427
2¼″ x 6″ c. r. mills with take-ups.

No. 428
8 block rod frame for spring wire, 22″ blocks.

No. 429
Rod and wire trucks.

No. 430
Double stroke cold headers, Waterbury or Manville No. 0, up to 3/16 wire 1″ blank.

No. 433
Electric butt welder, 8 to 16 ga.

No. 434
Electric spot welder for wire and light sheets.

No. 435
Nail machine (roofing) ⅝″ head on 12 ga.

No. 436
Flattening mill for .10 x .014 stapling.

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REGISTRY OF USED WIRE MILL MACHINERY

Exports and Imports of Wire

Exports of Iron and Steel Wire Products in April 1934 and April 1933
(In gross tons)

	April 1934	March 1934	April 1933
Wire rods	1,795	1,180	1,488
Hoops, bands and strip steel	3,109	3,038	1,102
Plain black or galvanized iron or steel wire	2,630	2,842	567
Barbed wire and woven wire fencing	3,184	3,233	1,111
Woven wire screen cloth	67	62	42
Wire rope	339	220	141
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufactures	438	328	251
Wire nails	1,461	1,300	431
Tacks	45	48	33
Other nails, including staples	379	427	167
Bolts, machine screws, nuts, rivets and washers	451	295	282
Total, these 11 classifications	13,898	12,973	5,615

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement bars	26	26	150
Hollow bars and drill steel	70	63	94
Merchant steel bars	2,074	1,031	951
Wire rods	1,208	1,300	542
Barbed wire	855	444	456
Round iron and steel wire	224	241	244
Telephone and telegraph wire		1	
Flat wire and strip steel	131	122	46
Wire rope and strand	154	130	145
Other wire	61	93	261
Hoops and bands	1,423	1,273	1,031
Nails, tacks and staples	615	540	323
Bolts, nuts and rivets	48	18	37
Total, these 13 classifications	6,889	5,282	4,280

THE export trade for April, while reaching the relatively high figure of 201,539 gross tons, decreased by 59,730 tons from the March figure.

✦ ✦ ✦

SCRAP, as usual, heads the list as the principal export. The total of 126,687 tons included shipments to Japan (55,113 tons); the United Kingdom (23,994 tons); Canada (12,118 tons); Poland and Danzig (11,962 tons); Italy (10,879 tons); Germany (4,766 tons); China (3,257 tons); Belgium (2,807 tons); and to Mexico (1,011 tons).

✦ ✦ ✦

THE second largest export was tinplate, which totaled 11,496 tons, of which China took 2,337 tons, Argentina 1,468 tons, Japan, 1,335 tons, Brazil 1,143 tons, Mexico 964 tons, Italy 677 tons, Uruguay 676 tons, and Egypt 504 tons.

✦ ✦ ✦

THE fifth product of the month in the point of tonnage was steel bars, going to numerous countries, chief among which were the Phillippine Islands (1,353 tons), Canada (1,268 tons), Chile (1,023 tons), and China (443 tons).

JAPAN was again the leading export market on a tonnage basis, during this month, its total of 58,962 tons including 55,113 tons of scrap, 1,591 tons of wire rods, and 1,335 tons of tin plate.

✦ ✦ ✦

THE second leading market was Canada, whose total of 27,594 tons included 12,118 tons of scrap, 2,852 tons of black steel sheets, 1,722 tons of shapes, 1,496 tons of cold rolled strip steel, 1,268 tons of steel bars, 1,203 tons of hoops and bands, 1,194 tons of other plate, 1,089 tons of heavy rails, and 957 tons of skelp.

✦ ✦ ✦

THE third largest market was the United Kingdom with 24,467 tons, which included 23,994 tons of scrap, and 241 tons of black steel sheets.

✦ ✦ ✦

THE fourth market was Poland and Danzig with 11,963 tons, made up entirely of scrap with the exception of one ton of wire rods.

✦ ✦ ✦

ITALY with 11,583 tons, was the fifth market and here again scrap predominated.

✦ ✦ ✦

THE sixth market was China (8,780 tons)—scrap also being the chief product purchased, totaling 3,257 tons, followed by heavy rails (1,755 tons), black steel sheets (664 tons), steel bars (443 tons), and other plate (268 tons).

✦ ✦ ✦

BRAZIL followed with 7,543 tons, of which the chief products were heavy rails (3,699 tons), tin plate (1,143 tons), galvanized steel sheets (612 tons), and barbed wire (516 tons).

✦ ✦ ✦

IMPORTS in April (26,862 tons) declined from the 38,393 gross tons imported in the preceding month.

✦ ✦ ✦

PIG iron (8,253 tons) was the principal product imported, and was supplied by the Netherlands (6,609 tons), British India (871 tons), Norway (402 tons), Canada (199 tons), Kwantung (147 tons), and Chile (25 tons).

✦ ✦ ✦

CANADA supplied practically all of the scrap imported into the United States, furnishing 5,036 of the 5,214 tons imported.

✦ ✦ ✦

THE imports of merchants and other steel bars (2,074) increased, and were supplied chiefly by Belgium (1,432 tons), Sweden (333 tons), Germany (216 tons), France (54 tons), and the United Kingdom (21 tons).

✦ ✦ ✦

THE Netherlands was the chief source of imports with 6,609 tons of pig iron included in its total exports of 6,885 tons to the United States. It also supplied 272 tons of barbed wire.

✦ ✦ ✦

NEXT was Canada with 6,659 tons, including 5,036 tons of scrap, 1,107 tons of ferromanganese, and 199 tons of pig iron.

✦ ✦ ✦

FOLLOWING, came Belgium with 4,432 tons, including 1,305 tons of shapes, 1,045 tons of hoops and bands, and 1,432 tons of merchant and other steel bars.

✦ ✦ ✦

GERMANY was the fourth important source of imports with 2,618 tons, including barbed wire (538 tons), nails (595 tons), merchant and other steel bars

(*Please turn to page 224*)

A Review of Recent Wire Patents

No. 1,955,761, WINDING MACHINE, Patented April 24, 1934 by Niels Pedersen, Philadelphia, Pa., assignor by mesne assignments, to General Cable Corporation, New York, N. Y., a corporation of New Jersey.

This and the next three patents are for a winding machine adapted for winding wire into helics or bobbins, and particularly copper wires. In the operation of the machine certain of the layers of paper insulation are caused to be coarsely wound relative to other layers of the insulation.

✦ ✦ ✦

No. 1,955,763, WINDING MACHINE, Patented April 24, 1934 by Auguste L. Saltzman, Orange, N. J., assignor, by mesne assignments to General Cable Corporation, New York, N. Y., a corporation of New Jersey.

A winding spindle is provided with means to deliver a single sheet of insulating material and automatically operated means whereby a number of the sheets may be delivered.

✦ ✦ ✦

No. 1,955,764, WINDING MACHINE, Patented April 24, 1934 by Auguste L. Saltzman, Orange, N. J., assignor, by mesne assignments, to General Cable Corporation, New York, N. Y., a corporation of New Jersey.

A portion of this machine comprises a mechanism for operatively feeding insulating material to the wire at successively increasing speeds.

✦ ✦ ✦

No. 1,955,908, METHOD AND APPARATUS FOR APPLYING WEB COVERINGS TO STRANDS, Patented April 24, 1934 by Charles B. Fantone, Lyndhurst, and Reuben M. Jameson, Teaneck, N. J., assignors to Syncro Machine Company, Arlington, N. J., a corporation of New Jersey.

This is an electrically actuated apparatus, the electrical connections being such that the field of the generator and the serving head motor employed in the construction are normally energized so that any movement of the winding capstan or the serving head itself effects concurrent movement of the other.

✦ ✦ ✦

No. 1,956,398, APPARATUS FOR HANDLING WIRE, Patented April 24, 1934 by Frank H. Nullmeyer, Youngstown, Ohio.

More specifically, the invention covers a truck for supporting coils of wire disposed with their peripheries upon the floor of the truck, a supporting beam being vertically spaced above and over the floor and extending in parallelism therewith.

✦ ✦ ✦

No. 1,956,399, METHOD OF HANDLING WIRE, Patented April 24, 1934 by Franklin H. Nullmeyer, Youngstown, Ohio.

The method covers the handling of a number of annular coils of wire or the like, the coils being disposed side by side in axial alignment, whereupon there is inserted through the coils a supporting member, the member being raised to transfer the weight of the coils there-

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

to and lift them from the surface on which they were initially disposed, there being another supporting member inserted through the coils, the first supporting member being lowered sufficiently to transfer at least a portion of the weight of the coils to the second member, whereupon the first member is withdrawn.

✦ ✦ ✦

No. 1,956,401, HEATING FURNACE FOR BANDS AND WIRES, Patented April 24, 1934 by Emil Friedrich Russ, Cologne-on-the-Rhine, Germany.

This heating furnace is provided with a rectilineal central axis and conveyor rollers for the bands and wires situated outside the furnace, supporting rollers being provided near the middle of the furnace and covered with refractory material and situated considerably lower in vertical direction than the conveyor rollers serving for conveying the material to be heated.

✦ ✦ ✦

No. 1,956,575, METHOD OF PRODUCING ELECTRIC CONDUCTORS, Patented May 1, 1934, by Anthony P. Hinsky, Brooklyn, N. Y.. assignor, by mesne assignments, to Pyro Products Corporation, Brooklyn, N. Y., a corporation of New York.

To the wire conductor, this inventor applies an even thickness of a colored opaque compound at circumferentially spaced intervals and so as to form recesses between the deposits, and then fills the recesses with another compound to provide an even thickness compound coating on the conductor.

✦ ✦ ✦

No. 1,956,576, DEVICE FOR APPLYING COATINGS TO ELECTRIC CONDUCTORS, Patented May 1, 1934, by Anthony P. Hinsky, Brooklyn, N. Y., assignor, by mesne assignments, to Pyro Products Corporation, Brooklyn, N. Y., a corporation of New York.

This device is intended for applying the several coatings referred to in the preceding patent.

✦ ✦ ✦

No. 1,956,632, COIL WINDING MACHINE, Patented May 1, 1934, by Edward Snyder, Fort Wayne, Ind., assignor to General Cable Corporation, New York, N. Y., a corporation of New Jersey.

This machine is stated to be adapted for winding compact, uniformly wound coils of any desired size.

✦ ✦ ✦

No. 1.956,639, ELECTRICAL CONDUCTOR, Patented May 1, 1934, by Alan S. Dana, New Haven, and Ralph B. Norton, Seymour, Conn., assignors to The Kerite Insulated Wire & Cable Company, Incorporated, Seymour, Conn.

More particularly, this conductor is stated to be adapted for high voltage where there is likely to be caused sparking from the sheath. The inventor provides a conductor with a graphatic paste held in the braided under sheath surrounding the conductor.

✦ ✦ ✦

No. 1,956,721, INSULATED ELECTRICAL CONDUCTOR, Patented May 1, 1934, by Joseph A. Kennedy, Pawtucket, R. I., assignor to Anaconda Wire & Cable Company, New York, N. Y., a corporation of Delaware.

Impregnating the jacket of this conductor is a body of stearin pitch, with a layer of rubber engaging and surrounding the pitch body.

✦ ✦ ✦

No. 1,956,730, METHOD OF MAKING ELECTRICAL CABLES, Patented May 1, 1934, by Lester O. Reichelt, Cranford, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

More particularly, the method lies in the manufacture of telephone cables. The bound group of wire strands is twisted to reduce the over-all length and thereby introduce surplus strand material. A plurality of groups are then stranded together in a direction opposite to the direction of the strand twist so as to absorb a portion of the surplus strand material.

✦ ✦ ✦

No. 1,956,756, WIRE BENDING APPLIANCE, Patented May 1, 1934, by Ralph Dillingham, Hart, Michigan.

This device is intended for bending and cutting wire into predetermined lengths.

✦ ✦ ✦

No. 1,956,951, CHARACTERIZED ELECTRIC CONDUCTOR AND THE LIKE, Patented May 1, 1934, by Anthony P. Hinsky, Brooklyn, N. Y., assignor, by mesne assignments, to Pyro Products Corporation, Brooklyn, N. Y., a corporation of New York.

This is the product as manufactured by the machine described in patent 1,956,576 and made according to the method in patent 1,956,575.

✦ ✦ ✦

No. 1,957,234, DRAWING DIE, Patented May 1, 1934, by Karl Schroter, Berlin-Lichtenberg, and Hans Wolff, Berlin, Germany, assignors to General Electric Company, a corporation of New York.

This drawing die has a helical groove, adapted to contain lubricant, the groove consisting of a single turn.

✦ ✦ ✦

No. 1,957,242, INCANDESCENT LAMP FILAMENT, Patented May 1, 1934, by Walter Berger, Dresden-Altstadt, Germany, assignor by mesne assignments to General Electric Company, a corporation of New York.

It is stated that this filament will not sag nor distort, and comprises refractory metal wire arranged in a plurality of parallel sections of wavy contour, the crests and troughs of adjacent sections being staggered with respect to one another.

(*Please turn to page 225*)

Wire Association Questions and Answers

Question 1620
Wire Rope Load

The Wire Association:

As a member of the Wire Association, I beg to put forward the following question to your technical experts or research department, and would be obliged if you would let me have their considered opinion.

What is the maximum safe load for a triple sheave carriage running under the following conditions:

Sheave—Diameter on tread 17 inches

Standing Line—Running on 2" dia. rope with approximately 170 tons breaking strain.

Span—2865 feet

Declivity—35% average

Sag—7.6 taken at right angles.

✦ ✦ ✦

(For replies No. 1 to No. 5a inclusive, see May issue.)

The Wire Association:

Answer No. 9

In the May, 1934, issue of your magazine "Wire and Wire Products", question 1620 on page 146, concerning logging cableway problem, was of some interest to the writer as I had recently written an article entitled "Stresses in Cableway Ropes" which is applicable to this particular problem.

✦ ✦ ✦

Am enclosing Plate 2 from this article as the formulae pertaining to inclined spans are given on this plate.

✦ ✦ ✦

Considering the problem as presented the following values may be written for the details as shown in fig. 3 on plate 2 for an inclined span length of 2865 ft., a deflection of 7.6% (at right angles to the chord) and an angle of declivity of 35%; S = 2704', d_1 = 231', D = 946' and α = 19° 17'.

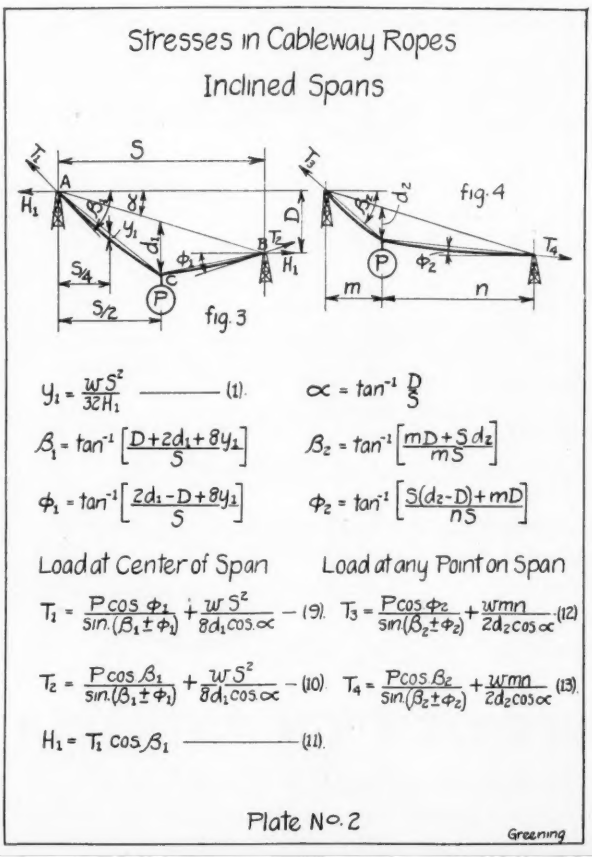
The Wire Association is for the specific purpose of improving production methods. It was organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The inquiries discussed were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

For a factor of safety of 3 on the 2" diam. 6x19 Seale rope of 170 tons breaking strength, the maximum tension in the cable is approximately 113,000# which gives, from formula 9, plate 2, the following data: $Y_1 = 14.7'$; $B_1 = 29°27'$, $\phi^1 = 7°43'$ and the maximum load that may be put on the cable of 16.2 tons; this load including the weight of the carriage and the load itself.

✦ ✦ ✦

For a factor of safety of 4 or a tension in the cable of 85,000 lbs., there follows, $Y_1 = 19.2$, $B_1 = 30°2'$, $\phi^1 = 6°58''$, and the max. load "P" of 11.5 tons.


Stresses in Cableway Ropes
Inclined Spans
fig. 4
fig. 3
$Y_1 = \frac{wS^2}{32H_1}$ ——— (1)
$\alpha = \tan^{-1}\frac{D}{S}$
$\beta_1 = \tan^{-1}\left[\frac{D+2d_1+8y_1}{S}\right]$
$\beta_2 = \tan^{-1}\left[\frac{mD+Sd_2}{mS}\right]$
$\phi_1 = \tan^{-1}\left[\frac{2d_1-D+8y_1}{S}\right]$
$\phi_2 = \tan^{-1}\left[\frac{S(d_2-D)+mD}{nS}\right]$
Load at Center of Span
Load at any Point on Span
$T_1 = \frac{P\cos\phi_1}{\sin(\beta_1\pm\phi_1)} + \frac{wS^2}{8d_1\cos\alpha}$ — (9)
$T_3 = \frac{P\cos\phi_2}{\sin(\beta_2\pm\phi_2)} + \frac{wmn}{2d_2\cos\alpha}$ (12)
$T_2 = \frac{P\cos\beta_1}{\sin(\beta_1\pm\phi_1)} + \frac{wS^2}{8d_1\cos\alpha}$ — (10)
$T_4 = \frac{P\cos\beta_2}{\sin(\beta_2\pm\phi_2)} + \frac{wmn}{2d_2\cos\alpha}$ (13)
$H_1 = T_1\cos\beta_1$ ——— (11)
Plate No. 2
Greening

A factor of safety of 2 on the skylines of logging cableways is not uncommon and the max. load on the skyline would then become 25 tons.

✦ ✦ ✦

The important consideration in the practical aspect of this skyline installation is that of the deflection of the unloaded cable, which must be such that when loaded, the deflection "d_1" is 231 ft. and for each loading condition of 11.5, 16.2 and 25 tons load; the unloaded cable deflection will be of different values, which may be determined from the cubic equation (17) on plate 3.

✦ ✦ ✦

The actual stresses will be slightly less than that given by equation (9) plate 2, as the vertical components of the traction and the hoisting rope stresses will decrease the load somewhat but this factor is usually neglected.

✦ ✦ ✦

As to the factor of safety with the corresponding loads to use, this is a question in which there are several governing considerations; if a relatively long and economical cable life is a requisite, then the minimum load value of 11.5 tons should be used; if this factor is not of prime importance, then the load of 16.2 tons may be used and if the maximum load is accurately known which is improbable for a logging skyline and the loaded deflection can be fixed accurately, then a load of 25 tons is permissible as a maximum but it will be at a sacrifice of cable life, or service as this load leads to excessively high unit bearing pressures of the 17" tread diameter sheaves on the rope.

✦ ✦ ✦

On account of the indeterminate loadings on logging skylines, the factor of safety of 3, giving a load of approximately 16 tons is advisable and even this load will lead to high bearing pressures of sheaves on the cable.

✦ ✦ ✦

The answers given by your correspondents certainly vary widely; imagine a range from 3¾ to 45 tons.

✦ ✦ ✦

One correspondent states that a wire rope centre does not add to the strength of a wire rope; in my former capacity as chief engineer of the American Cable Co., I had occasion to test many wire ropes with wire rope centres; for example, the suspender ropes on the Phila.-Camden bridge, the Detroit bridge, the Mt. Hope bridge and the Portsmouth, Ohio, bridge and on many shovel hoist and dragline excavator ropes; for a 7x7 independent wire rope centre in a wire rope, of the same grade of steel as the rope itself, the increase in strength from the wire rope centre will be approximately 12%, so that the 10% as formerly given in the manufacturers' catalogues is conservative and the new value of 7½% in the latest lists permits of cast steel wire rope centres being used in the higher grade ropes.

✦ ✦ ✦

Two correspondents seem to be concerned about the breaking strength of a 2" diam. 6x19 Seale rope; our stand-

(*Please turn to page 229*)

'Round the World With the Wire Industry

British National Federation

AT a special meeting held April 19, the British National Federation of Iron and Steel Manufacturers gave its approval to the revised Constitution under which the powers of the central organization, which in the future is to be known as the British Iron and Steel Federation, are extended and strengthened. The purpose of this reorganization is to provide an instrument for the reorganization of the iron and steel industry as a whole, which the Government continues to insist is essential if the present protective duties are to be continued. A resolution adopted immediately after the constitution directed that earnest attention be given to measures to be taken in collaboration with associations in the industry (1) to promote the maximum manufacturing and commercial efficiency throughout the industry, (2) to expand the export trade in iron and steel products, and (3) to obtain the affiliation of associations. Expression was also given to the necessity for "effective measures to be taken in collaboration with the government to divert to our own people the employment these imports represented"—the imports in question being at the rate of one and a half million tons a year, despite the current 80 percent operation rate of the British industry.

✦ ✦ ✦

Canada Rules On Tin Plate Imports

NEW rulings specifying the kinds of tin plate being made in **Canada** and that not being so made is included in Canadian) Appraisers' Bulletin No. 4185 of April 10, 1934. Shippers of tin plate to Canada are required to show the sizes, weights and/or gauges, and the weight of the tin coating when claiming the reduced rate of 15 percent as on tin plate of a kind or grade not made in that country —the rate being 20 percent otherwise.

✦ ✦ ✦

New Tube Works For Birmingham

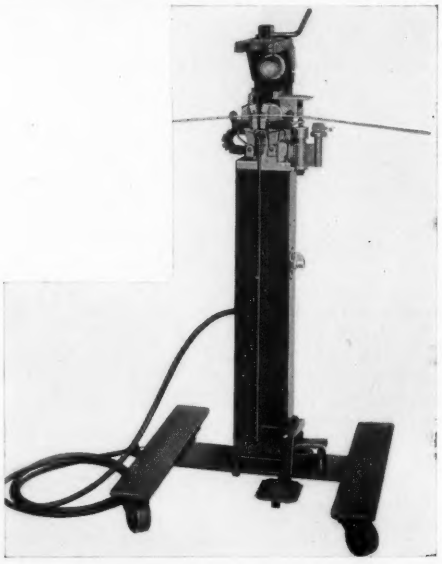
A NEW factory is at present being erected at Birmingham, **England**, for the English Seamless Tube Company, which proposes to produce hot-finished, weldless steel tubes as the raw material for the Company, whose entire supplies associated Universal Steel Tube to the present have been imported from Sweden. The equipment to be installed is of a type entirely new to England and will be operated under license from the American holders of the patents.

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

Micro-Weld Butt Welders

The increasing use of these efficient butt welders by leading wire manufacturing and fabricating plants throughout the world, is evidence of the superiority of MICRO-WELD design and construction.

Only MICRO-WELDERS are equipped with the patented MICRO-WELD adjustment dials for making precision welds faster.



MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE, CHICAGO, ILL.

Telephone State 7468 **General Offices and Factory, Peoria, Ills.**

'Round the World With the Wire Industry

Wire Rope Market In Argentine

WIRE rope, galvanized and ungalvanized, is imported into **Argentina** in large quantities, since there is no local manufacture of this product. Preliminary statistics for 1933 show that 944,031 kilos of ungalvanized and 459,745 kilos of galvanized rope and cable were imported in that year. Prices on German rope are considerably lower than are those quoted on rope from other sources, although the United States continues to dominate in the trade in the ungalvanized variety.

✦ ✦ ✦

THE rope imported finds perhaps its widest use in the oil fields—the private oil companies purchasing their requirements through their head offices in New York or London, and the State-owned company, along with the Navy and Public Works Departments, buy their cable by tender.

✦ ✦ ✦

German Wire Cartel Notes And Changes

THE agreement between the German wire rod cartel on the one side and the wire industry on the other side, by which wire makers voluntarily agree to restrict imports in order to help the steel industry, will be followed by an agreement between the wire cartel and the wire industry, restricting imports of wire products. In both cases special allowances will be made by the producers to the consumer which vary from 4 to 7%, especially in districts where the freight rates are higher than German rates.

ACCORDING to the report of the German wire cartel, the wire industry had been operating, at the end of the third week in May, at approximately 44% as compared with 37% last year. The improvement is negligible, compared with the very sharp advance of industrial production in the steel centers (973,000 tons of steel produced in April, 1934 compared with 536,000 tons in April 1933).

✦ ✦ ✦

MANY exporters who were unable to come to terms with the wire cartel, have been driven to try their luck with outsiders and it is no secret that most of the Japanese wire and wire nails which recently have been marketed in Europe, have been sold through the medium of some German, British or Dutch export mer-

(*Please turn to page 230*)

NICKO

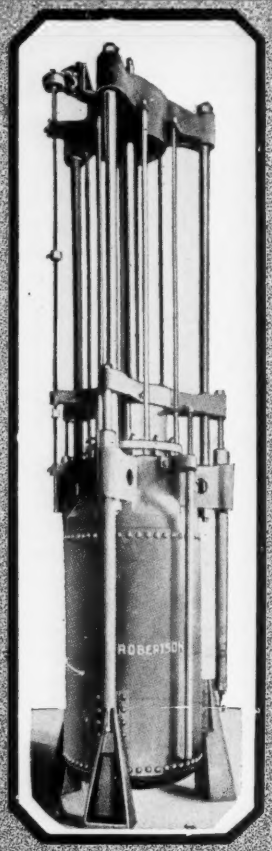
A PICKLING STABILIZER ▲ ▲ ▲
FOR STAINLESS STEEL ▲ ▲ ▲
WIRE AND STRIP ▲ ▲ ▲

USED IN DILUTE SULPHURIC ACID
RAPID—FUMELESS—SAFE

AN EXCELLENT INHIBITOR ON 18 - 8
▲ ▲ ▲ METAL LOSS ABOUT ONE - TENTH NORMAL ▲ ▲ ▲

DELANY CHEMICAL CO.
COTTMAN AND MILNOR STS.,
PHILADELPHIA, PA.

An Accumulator ~that's "entirely different" and more efficient



The ROBERTSON HYDRO-PNEUMATIC ACCUMULATOR

—is so different in design and construction that it completely overshadows the old types of cumbersome, slow, space-taking accumulators.

For 1500-6000 lbs. Hydraulic Pressure, the Robertson Accumulator occupies the very minimum of space—requires no heavy foundations—operates at low air pressure (175 lbs.)—is equipped with Automatic Auxiliary Compressor (which maintains pressure in the cylinder and storage tanks). Finally, an accumulator that always gives Efficient, Trouble-free Service.

Other Hydraulic Equipment by Robertson

Note: Robertson makes all types of lead-encasing machinery required by rubber hose and electrical cable makers: Extrusion Presses, Hydraulic Pumps, Melting Furnaces and Pots, Dies and Cores, also Lead Sheath Stripping Machines and Hydro-pneumatic Accumulators.

Robertson lead encasing equipment is virtually a standard thing here and abroad, where in many cases it is used exclusively.

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John ROBERTSON CO. INC.

125-137 Water Street Brooklyn, N. Y

Exports and Imports

(*Continued from page 219*)

(216 tons), and hoops and bands (215 tons).

✦ ✦ ✦

SWEDEN was next with a total of 2,115 tons, including wire rods (945 tons), merchant and other steel bars (333), iron bars (158 tons), round iron and steel wire (131 tons, flat wire and strip steel (127 tons) and other pipe (114 tons).

✦ ✦ ✦

CARD clothing imports aggregated 35,218 square feet valued at $36,568, all of which was supplied by the United Kingdom.

✦ ✦ ✦

WIRE cloth and screening imports totaled 39,156 square feet. The countries of supply were Germany (25,208 square feet), Canada (8,244 square feet), and France (5,709 square feet).

✦ ✦ ✦

FOURDRINIER wire imports totaled 30,180 square feet for April, as compared with 3,604 square feet for the preceding month. The countries of supply were Austria (28,400 square feet), and Sweden (1,780 square feet).

✦ ✦ ✦

WIRE fencing and netting imports declined sharply. Of that galvanized before weaving, 429,600 square feet were received —all of it from Germany; while there were no imports of fencing and netting galvanized after weaving. Wire heddle imports amounted to 35,000 pieces in April—30,000 from France, and 5,000 from Germany.

✦ ✦ ✦

EXPORTS of iron and steel wood screws during April, 1934 totaled 45,494 gross, valued at $5,193. Of this total the Philippine Islands took 8,880 gross, valued at $840; Cuba 8,087 gross, valued at $960; Mexico 8,079 gross, valued at $860; Japan 7,000 gross, valued at $745; Peru 2,680 gross, valued at $346; Chile 2,063 gross, valued at $184.

✦ ✦ ✦

EXPORTS of brass wood screws totaled 5,739 gross, valued at $2,507. Of this amount the Philippine Islands took 1,937 gross valued at $579; Cuba 959 gross,

valued at $334; Canada 851 gross, valued at $622; Panama 392 gross, valued at $272; Venezuela 370 gross, valued at $109.

✦ ✦ ✦

IMPORTS of wood screws during the same period amounted to nothing. There were none.

✦ ✦ ✦

A Review Of Recent Wire Patents

(*Continued from page 220*)

No. 1,957,487, MULTICORE CABLE WITH THERMOPLASTIC INSULATION, Patented May 8, 1934, by Oliver E. Buckley, Maplewood, N. J., and Frank S. Malm, Nordenham, Germany, assignors to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York.

This is a telephone cable of the plural core type, the interstices between the several cores being filled with a material of good dielectric properties, substantially impervious to sea water, such as India rubber.

✦ ✦ ✦

No. 1,957,942, WIRE COATING MACHINE, Patented May 8, 1934, by Wilber H. Convers, Poughkeepsie, N. Y.

This device is adapted to be mounted in a wire coating machine in the path of travel of the wire, so wire will travel through it several times, receiving a coat of insulating material each time it passes.

✦ ✦ ✦

No. 1,958,243, APPARATUS FOR FEEDING WIRES, Patented May 8, 1934, by George Illingworth, East Cleveland, Ohio, assignor to General Electric Company, a corporation of New York.

More particularly, the device is intended for locating and feeding in the wires for the stems of incandescent electric lamps, and is described as an attachment for machines such as that disclosed in U. S. patent 1,655,141.

✦ ✦ ✦

No. 1,958,281, ELECTRIC CABLE, Patented May 8, 1934, by Thomas Robertson Scott, Aldwych, London, England, assignor to International Standard Electric Corporation, New York, N. Y.

About the wire core is a metalized layer preferably in the form of metalized paper tape of the same potential as the core. This metalized layer is provided to form a capillary reservoir.

✦ ✦ ✦

No. 1,958,687, SHIELDED CABLE, Patented May 15, 1934, by Leslie C. Wolcott, Warren, Ohio, assignor, by mesne assignments, to General Motors Corporation, Detroit, Mich., a corporation of Delaware.

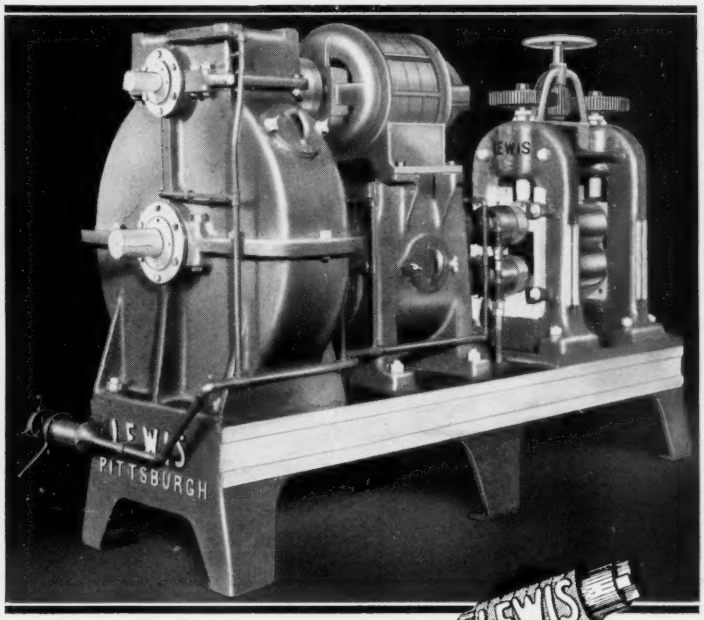
This is an ignition cable comprising a wire surrounded by a rubber covering, a fabric covering, lacquer, tape, a flexible metallic shield, fabric, and a lacquer coating.

✦ ✦ ✦

No. 1,958,827, WREATH HOOP WIRE, Patented May 15, 1934, by Carl Krausen, Aachen, Germany.

(*Please turn to page 226*)

LEWIS WIRE FLATTENING AND NARROW STRIP MILL



Unit Construction.

Lewis Cut Herringbone Gear Reduction Unit directly connected through a flexible coupling.

Forged Steel Pinions.

Bearings are lubricated by compression grease cups.

All gears run in oil.

Neck Bearings are die cast genuine babbitt or roller bearings.

Housings have T slots for attaching coilers and guide bars.

This Mill is built in a complete unit and can be moved at any time to any desired location in the plant. The rolls may be of any quality specified by customer, including hardened steel rolls, or water cooled rolls.

• • •

LEWIS MAKES A COMPLETE LINE OF ROLLING MILL MACHINERY INCLUDING:

Mill drives up to and including 6,000 HP. Shape Straightener Machines up to and including 24 inch I beam. Motor operated Screw-Down for Mill. High Speed Gear Sets for Continuous Rod Mills. Continuous Bar and Billet Mills. Cold Mills for Sheet and Strip. Rail Breakers. Rail Re-Rolling Mills. Universal Mill Spindles. Chilled Iron and Iron Alloy Rolls for Iron, Steel, Brass, Copper, Aluminum, Zinc and Nickel. For hot Sheets, tin plate and strip—for cold sheets, tin plate and strip. For merchant bars and rods, Shears—Vertical Alligator—Cropping—Plate and Squaring. Special Machinery—Testing Machines and Iron and Steel Castings.

PITTSBURGH, PA.

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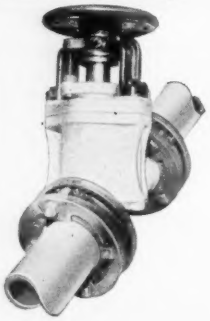
Muriatic Acid is tough on valves . . . but

DURICHLOR VALVES

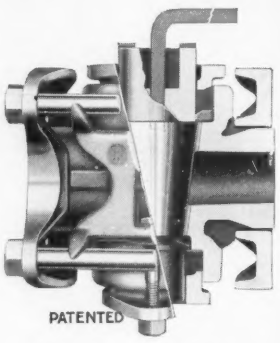
don't lose any weight over it.

DURICHLOR is almost completely resistant to Muriatic acid at all strengths and temperatures up to the boiling point. Durichlor Valves will handle Muriatic solutions, hot or cold, almost indefinitely.



Durichlor valves are made in several types and sizes—Y, quick releasing, lubricated, angle, check, gate, straightway.

Try one in your toughest spot—and your grandchildren will say, "The old man knew his valves when he put this one in".



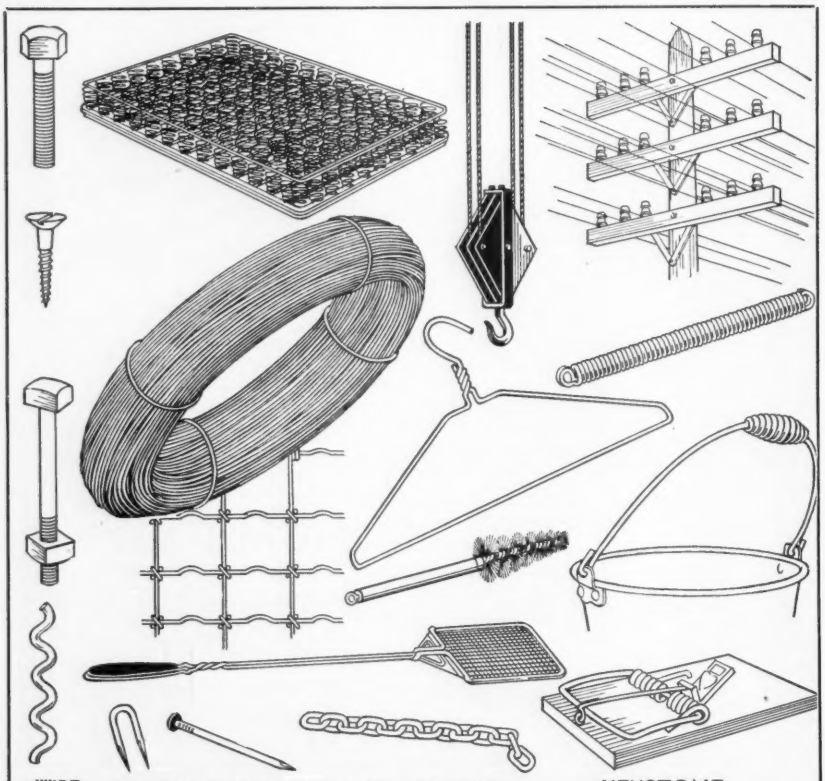
Cross-section "Plunger-Release" (Quick releasing) Valve. Sizes 1" to 4".

(Left) Y valve, sizes 1" to 6".

Write for Bulletin No. 161 and 400.

The Duriron Company, Inc.

442 N. Findlay St. Dayton, Ohio



WIRE . . . in a wide variety of sizes, finishes and analyses for the manufacture of products that require a special wire. Your inquiry will receive the careful attention of an organization experienced in furnishing uniform high quality wire that improves your product and reduces its cost.

KEYSTONE STEEL & WIRE CO.

PEORIA, ILL.

A Review of Recent Wire Patents

(*Continued from page 225*)

This wire is particularly adapted for constructing plant wreaths, and is formed by a rolled wire having a core and continuous ribs extending along opposite sides of the core in a direction perpendicular to the plane of the hoop.

✦ ✦ ✦

No. 1,958,870, METHOD AND MACHINE FOR BUNCHING LEAD WIRES, Patented May 15, 1934, by Joseph Stuart, 2d, Wilmington, Del., assignor to Hercules Powder Company, Wilmington, Del., a corporation of Delaware.

Means is provided for fixedly holding the end of a wire extending from a wire supply, with a device acting on the wire between the holding means and the supply to bend the wire into a number of independent adjacent folds.

✦ ✦ ✦

No. 1,959,339, ELECTRIC POWER CABLE, Patented May 22, 1934, by Charles E. Bennett, Hawthorne, N. J., assignor to The Okonite-Callender Cable Company, Inc., Paterson, N. J., a corporation of New Jersey.

Adapted for underground transmission, this cable comprises an insulated conductor, an electro static shield surrounding the insulation, a grounded metallic enclosure for the cable with insulation between the shield and the enclosure, there being a single ground connection for the shield.

✦ ✦ ✦

No. 1,959,354, ELECTRIC CABLE, Patented May 22, 1934, by Guy N. Everest, Ridgewood, N. J., assignor to The Okonite-Callender Cable Company, Incorporated, Paterson, N. J., a corporation of New Jersey.

This is a multi-conductor electric cable comprising separate impregnated paper insulated conductors submerged in a large volume of oil under sufficiently high pressure to materially increase the dielectric strength of the oil, enclosed in a conduit comprising an elastic hard metal case spirally wound and interlocked to provide a liquid tight flexible conduit.

✦ ✦ ✦

No. 1,959,471, MANUFACTURE OF CABLES. Patented May 22, 1934, by Axel Erik Haettner, Appelviken, Sweden, assignor to Telefonaktiebolaget L. M. Ericsson, Stockholm, Sweden, a registered company of Sweden.

Particularly adapted for the manufacture of telephone cables, the inventor provides a method of compensating cross-talk couplings and consists in measuring the cross-talk couplings during the twisting operation, and compensating for changes in the balance by changing the mutual positions of the cable conductors in the course of the twisting operation in accordance with the variations of the coupling as ascertained by the measurements.

✦ ✦ ✦

No. 1,959,526, MULTICONDUCTOR SHIELDED CABLE, Patented May 22, 1934, by William A. Del Mar, Greenwich, Conn., assignors to Habirshaw Cable & Wire Corporation, New York, N. Y., a corporation of New York.

In the manufacture of this cable, twisting of the insulation conductor on its own axis is avoided and thus injury

to the previously applied insulation around the other conductors does not take place.

✦ ✦ ✦

No. 1,960,315, APPARATUS FOR AND METHOD OF MAKING WIRE GLASS, Patented May 29, 1934, by Elisha W. Paxton and Arthur W. Schmid, Washington, Pa., assignors, by mesne assignments, to Mississippi Glass Company, New York, N. Y., a corporation of New York.

Means is provided for variably tensioning the wire netting just previous to its merging with the glass, the machine being particularly adapted for placing the wire centrally of the glass.

✦ ✦ ✦

No. 1,960,426, MANUFACTURE OF WIRE ROPES, Patented May 29, 1934, by Hellmuth Zundorf, Cologne, Germany, assignor to American Cable Company, Inc., Bridgeport, Conn., a corporation of Delaware.

Specifically, the invention lies in a device for removing the strains in wire ropes by post forming, and comprises two bending devices mounted one behind the other so as to be capable of rotating independently of each other about the axis of the finished rope, each bending device consisting of a supporting frame with guide rollers and deflecting rollers mounted in the frame for deflecting the rope out of its stretching position.

✦ ✦ ✦

No. 1,960,732, WIRE BENDING MACHINE, Patented May 29, 1934, by David M. Dunwoodie, Trotwood, Ohio.

This bending machine is particularly adapted for bending wire used in electrical resistant apparatus.

Agency Lines Wanted

TRAINED sales engineer (metallurgist).

✦ ✦ ✦

TWO years steel mill operating, eight years technical sales and service experience with steel, rod and wire, galvanizing, tinplating, drop forging fields, during which time sales and service organizations were trained and built up.

✦ ✦ ✦

DESIRES several mechanical and material lines appealing to above industries in the Pittsburgh, Cleveland and Detroit districts.

✦ ✦ ✦

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INDISPENSABLE!

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THREE WIDELY USED OAK DRAWING LUBRICANTS

Super Draw No. 5
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For copper, brass and phosphor bronze.

Master Draw No. 2
For steel and alloy steel wire. Particularly adaptable to draw bench work.

Master Draw No. 425
For drawing bars and shapes, (high or low carbon) on draw benches, WITHOUT LIME COAT.

Proper drawing lubricants are as indispensable as the machines on which your products are drawn. Your lubricants should be fitted to local conditions and to the brass, bronze, steel or copper.

The Oak Chemical Products Company will be glad to assist you in the determination of the right lubricant. Your inquiry will receive prompt, careful attention without obligation to you. Write today!

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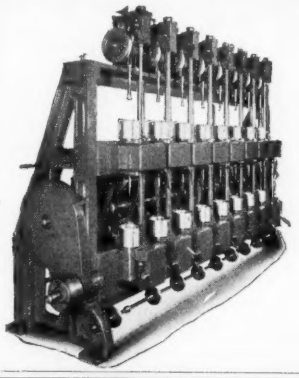
OAK CHEMICAL PRODUCTS COMPANY
Bechtelsville, Pa.

LUBRICANTS FOR COLD DRAWING ANY TYPE OF METAL



WHY PAY MORE?

When wire can be insulated at a lower cost on the AIMCO line of insulating machinery than on any other machines, the initial investment being less with consequent lower depreciation and maintenance charges, and the labor cost per pound of finished wire running remarkably low.

EST. 1855 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.

517 West Huntingdon St.
PHILADELPHIA PENNSYLVANIA U.S.A.

New Rating Won for Wire Rope

INCLUSION of wire rope in the Iron and Steel Article List for application of carload rates in Southern Freight Association territory, has been approved by the Southern Freight Association.

✦ ✦ ✦

ST. LOUIS interests were represented by A. J. Koke of A. Leschen & Sons Rope Co.; R. J. Flannery, of the Broderick & Bascom Rope Co., and Carl Giessow, director of the Traffic Bureau of the Chamber. It was brought out that at the coastal ports St. Louis shippers must meet the low rail and water rates applying for Eastern manufacturers, and from the Pacific Coast, and that with wire rope excluded from the carload rate list in Southern Freight Association territory, shippers and manufacturers of this city were at a disadvantage in comparison with cities in other sections of the country. Heretofore, there has been only a small spread between carload and less-carload rates for St. Louis shippers.

Patents—Trade Marks

Before disclosing your inventions to anyone send for blank form "Evidence of Conception" and instructions "How to Establish Your Rights".

All cases submitted given personal attention by members of the firm. Information and booklet free.

Lancaster, Allwine & Rommel

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Suite 438, 815-15th St., N.W. Washington, D. C.

BISCO

TUNGSTEN CARBIDE DIES

FOR

WIRE, ROD and TUBING

BARE NIBS—SEMI-FINISHED—FINISHED
ROUND AND SPECIAL SHAPES

THE BISSETT STEEL COMPANY

CLEVELAND

WORCESTER PHILADELPHIA CINCINNATI

STEELSKIN

REG. U. S. PAT. OFFICE

For High or Low Carbon Wire

WIRE DRAWING SOAPS

Established 30 years

R. H. MILLER CO., Inc. Homer, N. Y.

WIRE MILL FOR SALE

EQUIPPED TO DRAW FINE WIRE

In sizes from No. 15 to 36. All Finishes.

Located in East—Accessible to all Markets—
Low price—Satisfactory Terms.

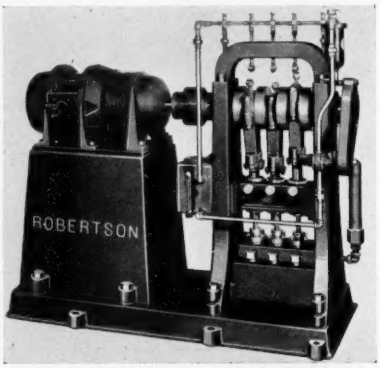
FOR INFORMATION ADDRESS

BOX 200—C/O WIRE AND WIRE PRODUCTS

17 East 42nd St., New York, N. Y.

New Small Capacity High Pressure Vertical Triplex Pump

THE small capacity high pressure vertical triplex pump illustrated here is built by John Robertson Co., Inc., No. 133 Water Street, Brooklyn, N. Y. in three sizes and for pressures and capacities ranging from 1 gallon to 5 gallons at 6,000 lbs. per sq. inch pressure and from 2½ gals. to 12½ gals. at 2,500 lbs. hydraulic pressure, requiring 5, 15 and 20 horse-power, direct-connected gear reducer motors respectively, connected by flexible couplings directly to the pump shaft.



ALL shaft and eccentric bearings are bronze-lined and are lubricated automatically by means of an oil pump which delivers the oil from a supply tank through an oil filter to operate in bronze guides with a solid forged steel pump chamber having large passages for the water and a spring-balanced hydraulic safety valve complete the hydraulic end of a pump built for dependable service.

✦ ✦ ✦

R. V. Olson Now Vice President of Mossberg Pressed Steel Corp.

MR. R. V. OLSON, who for the past several years has been Secretary and Sales Manager of the Mossberg Pressed Steel Corporation of Attleboro, Mass., was, at a recent meeting of the Board of Directors, elected Vice-President and Sales Manager of the concern.

Questions and Answers

Wire Rope Load

(*Continued from page 221*)

ard 2" diameter 6x19 Seale hemp centre rope has a metallic area of 1.594 sq. inches; we would guarantee a minimum breaking strength of 170 tons (340,000#) on a unit wire strength of 250,000 lbs. per sq. inch, which is on the low side of improved plow steel wire and for a standard improved plow steel wire of 260,000 lbs. per sq. inch, we would guarantee a breaking strength of 177 tons.

✦ ✦ ✦

The Wire Association:

Answer No. 10

We have been much interested in the replies to Question 1620, as given on pages 146, 147 and 148 of your May issue. Surely the variety in the answers should give the most fastidious engineer plenty of scope for his guessing ability in making his selection from the answer —3¾ tons, 12 tons, 21 tons, and 30-45 tons! Surely those who recommended loads of 20 to 45 tons for this skyline are visionary optimists rather than practical engineers!

✦ ✦ ✦

Such skyline or cableway problems are quite frequently met with by the wire rope manufacturer, and we were interested to try our hand at this one. The method of calculation used was that developed by Prof. Russell Mills, of the University of Washington, which is a modification of, and improvement on, previous methods developed by Anderson, and by Fujioka. Prof. Mills' method appeals to us as being a very safe and sane one, which will give conservative and dependable results. In our calculations, we used the following data. Horizontal span = 2865 feet. Difference of elevation of head and tail spar trees = 1000 feet. Weight of rope = 7.0 pounds per foot. Ultimate strength of rope = 170 tons, which can be readily furnished in a 6 x 19 rope with independent wire rope center. Assuming a safety factor of 4.0, the resultant total static load, at the center of the span, figures as 13,000 pounds. This will produce a tension on the rope of 86,000 pounds at the upper spar tree, and 76,300 pounds at the lower spar tree. Note that 86,000 pounds gives a safety factor of 3.95, thus checking well with the initial assumption of 4.0. No calculations were made for static loads at other points in the span, or for the effects of a moving load. As some of your correspondents pointed out, the exact calculation of skyline stresses is quite impossible, due to the great variety and severity of the conditions and operations. And of course no theory can calculate the stresses due to heavily dragging loads, such as these skylines so often encounter. But for this very reason, the calculated loads should be conservative, to allow for excessive, but incalculable stresses.

Learn about PARALAN

Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

Write for further information. We may be able to solve your difficulties.

AMERICAN LANOLIN CORP.
LAWRENCE, MASSACHUSETTS

POSITION WANTED

METALLURGICALLY and steel plant trained engineer specializing for ten years in sales and practical servicing of steel mill products, desires connection in sales or service executive capacity.

✦ ✦ ✦

EXPERIENCE covers establishment, development and training of technical sales organizations to sell and service in the galvanizing, tinplating, pickling and chrome nickel alloy fields.

✦ ✦ ✦

FULL details upon request. Reply box 600, Wire and Wire Products, 17 E. 42nd St., New York, N. Y.

EFFICIENT PICKLING
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RODINE, SAVES ACID AND METAL
Prevents over-pickling. Minimizes acid brittleness and acid fumes.

Samples and Directions sent on request.

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VIANNEY
Famous Wire Drawing Diamond Dies
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"DOING ONE BIG THING WELL"
NEP. 100%
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New HOTEL EDISON
47th ST.
JUST WEST of B'WAY
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1000 ROOMS
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Circulating Ice Water . . . Radio . . .
Large Closets . . . Full Length Mirrors
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Roof Solarium . . . Air-Cooled Restaurant
ROOMS from $2.50 SUITES from $6.00
IN THE HEART OF TIMES SQUARE

PAPER CABLE FILLER
FOLDED PAPER FLATS
PAPER INSULATION YARNS
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Formerly National Patent Reed Co.
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Continuous Straightening and Cutting Machinery
With
FLYING SHEAR
for round and shaped wire.
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Wire Mill Equipment, Stranding, Insulating, Drawing, Welding
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Subsidiary of
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Lynn, Massachusetts.

BRASS AND ZINC WIRE
THE PLATT BROS. & CO.
WATERBURY, CONN.

Round the World With the Wire Industry

(*Continued from page 223*)

chants, as the Japanese industry has no adequate sales organization.

✦ ✦ ✦

THE agreement concerning the restriction of the use of copper for the Post Office (Telegraphs and telephones) will be followed by similar agreements by which imported metals will be replaced by aluminum-alloys and electron-alloys, also in the cable and other industries. Agreements have already been drawn and confirmed in some parts of the industry.

✦ ✦ ✦

IT is estimated that total sales of stainless steel wires which are offered in 41 different qualities for all possible uses, amounted to more than 200 tons the first quarter of this year. The production of corrosion resisting wires is also rising.

✦ ✦ ✦

THE agreement between the wire cartel and the Dutch wire nail makers at Helmond will be extended, but the works of the Dutch makers will remain closed.

✦ ✦ ✦

GREAT BRITAIN is at present the best customer of the Continental wire rod and wire nail industry. Imports are 2-3 times better than last year and in spite of import duties, Continental makers are able to compete on the British market, though the Canadian competition is great.

✦ ✦ ✦

THE wire machinery export trade is reviving. Inquiries are numerous, particularly from Eastern Europe and the Far East, wire drawing machinery being the highest demand.

1934
Annual Meeting
of the
Wire Association
Will be held at New York, N. Y.
OCTOBER 1-5 INCLUSIVE
For Detailed Information Write
Richard E. Brown, Secretary
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Machinery For
Wire, Tube, And Brass Mills
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Broden Construction Co.
Wire Mill and Cold Rolling Equipment
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WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames—16" Frames, 8" Frames —Take-Up Frames, Wire Pointers—Puller Tongs.
General Castings for Wire Mill use.
Circulars on Request.
E. J. Scudder Foundry & Machine Co.
Trenton, N. J.

HIGH SPEED
Welding Wire Straightening and Cutting Machinery
Round Wire Straightening and Cutting Machinery
Flat Wire Straightening and Cutting Machinery
Roll and Rotary Wire Straighteners
THE F. B. SHUSTER CO.
New Haven, Conn.
Straightener Specialists Since 1866

JOHN ROYLE & SONS
PATERSON, NEW JERSEY.
MAKERS OF EXTRUDING MACHINES FOR COVERING ELECTRIC CONDUCTORS AND WELDING WIRE

Wire Drawing Diamond Dies
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WIRE DIE CORPORATION
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For more complete information, consult the annual Directory, Index & Buyers' Guide.

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See Furnaces—Various Headings

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New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CASTINGS—Wire Mill
E. J. Scudder Foundry & Machine Co., Trenton, N. J.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Delany Chemical Co., Tacony Station, Philadelphia, Pa.
Grasseli Chemical Co., Cleveland, O.

CLEANING & PICKLING EQUIPMENT
Broden Construction Co., Cleveland, O.
Duriron Co., The, Dayton, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

COATING—Protective
American Lanolin Corp., Lawrence, Mass.

COILERS—Sheet and Wire
H. J. Ruesch Machine Co., Newark, N. J.

CRANES—Wire Mill
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Diamond
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Cochaud Wire Die Corp., New York.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Wks., N. Y.

DIES—Rod and Tube Drawing
Bissett Steel Co., Cleveland, O.
Carboloy Co., Inc., Newark, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Bissett Steel Co., Cleveland, O.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Bissett Steel Co., Cleveland, O.
Carboloy Co., Inc., Newark, N. J.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEER—Consulting Wire Mill
Lewis, Kenneth B., New York, N. Y.

EYELETS—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FILLERS—Paper for Cable
E. W. Twitchell, Inc., Phila., Pa.

FURNACES—Annealing
Electric Furnace Co., Salem, O.

FURNACES—Automatic
Electric Furnace Co., Salem, O.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.

FURNACES—Lead Melting
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John Robertson Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
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Delany Chemical Co., Tacony Station, Philadelphia, Pa.
Grasseli Chemical Co., Cleveland, O.
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INSULATION—Cable or Cable Filler
E. W. Twitchell, Inc., Phila., Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Amer. Lime & Stone Co., Bellefonte, Pa.

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R. H. Miller Co., Homer, N. Y.
Oak Chemical Co., Bechtelsville, Pa.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Machinery Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Coilers
Broden Const. Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

1934

Annual Meeting

OF THE

Wire Association

WILL BE HELD AT NEW YORK, N. Y.

OCTOBER 1-5 INCLUSIVE

IN ASSOCIATION WITH THE

NATIONAL METAL CONGRESS

✦ ✦ ✦

Wire Association Headquarters At Hotel New Yorker

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EXHIBITION AT PORT AUTHORITY BLDG.

For Detailed Information Write

RICHARD E. BROWN, Secretary

17 E. 42ND STREET NEW YORK, N. Y.

BUYERS' GUIDE, Continued

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, ets.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Measuring Wire & Cable
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Lewis F'dry & Machine Co., Pittsburgh, Pa.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila. Pa.
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, O.
Hallden Machine Co., Thomaston, Conn.
H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Tinsel Rolling Mills
Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Welding Wire
Micro Products Co., Chicago, Ill.
F. B. Shuster Co., New Haven, Conn.
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Delany Chemical Co., Tacony Station, Philadelphia, Pa.
Grasselli Chemical Co., Cleveland, O.
Wm. M. Parkin & Co., Pittsburgh, Pa.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.

PAPER—Insulating
E. W. Twitchell, Inc., Phila., Pa.

POTS—Lead Melting
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Encasing
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REELS AND SPOOLS—All Kinds
Avoca Mfg. Co., Avoca, N. Y.

REEL AND TENSION STAND—
Sleeper & Hartley, Inc., Worcester, Mass.

REEL CRUTCHES
Watson Machine Co., Paterson, N. J.

ROLLING MILLS—See Machinery—Rolling Mill

ROLLS—
Lewis F'dry & Machine Co., Pittsburgh, Pa.

RUST PROOF COMPOUND
American Lanolin Co., Lawrence, Mass.

SOAPS—Wire Drawing
R. H. Miller Co., Homer, N. Y.
Oak Chemical Co., Bechtelsville, Pa.

SPOOLS—Wood
Avoca Mfg. Co., Avoca, N. Y.

STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

VALVES AND FITTINGS—Acid Proof
Duriron Co., The, Dayton, O.

VULCANIZERS
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.

WIRE—Manufacturers
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Nickel Silver and Phosphor Bronze
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification
Seymour Mfg. Co., Seymour, Conn.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Keystone Steel & Wire Co., Peoria, Ill.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

THE WATSON MACHINE COMPANY

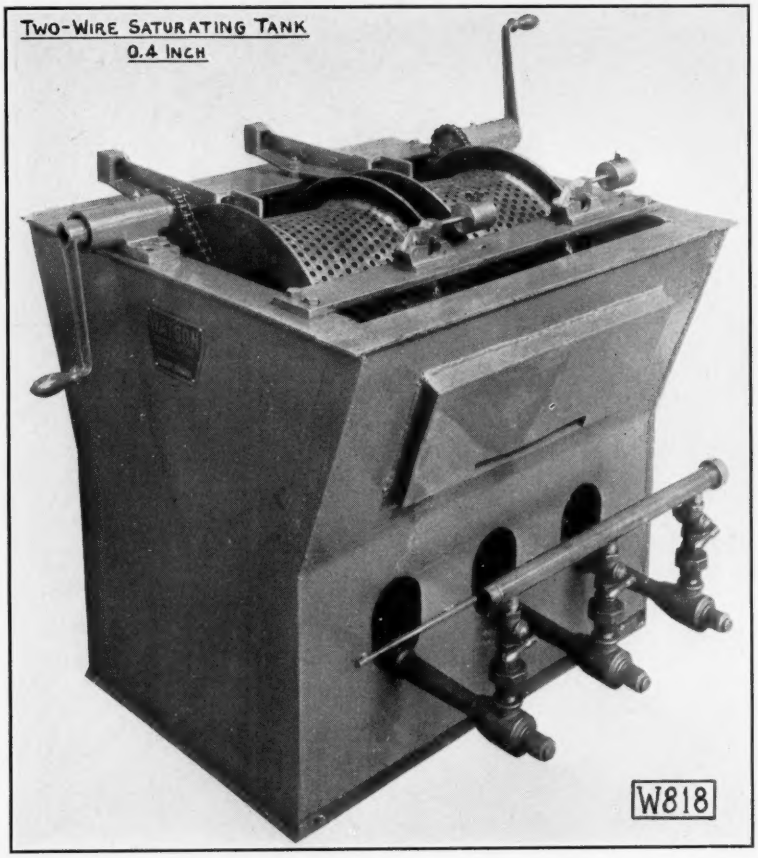
ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE AND CORDAGE MACHINERY

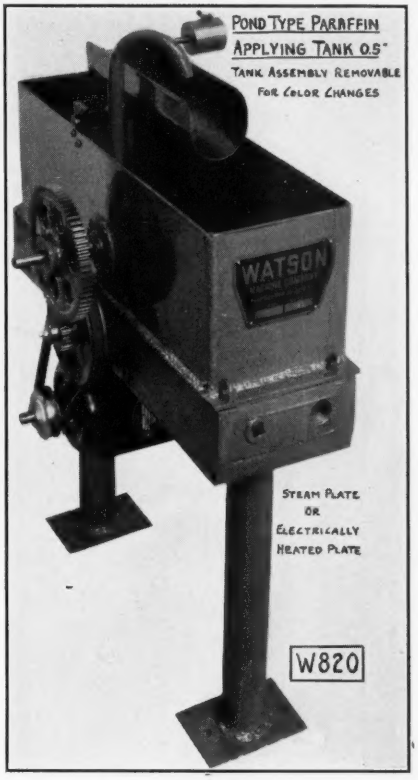
TANKS FOR APPLYING COLOR, PETROLATUM, PARAFFIN, Etc.

TWO-WIRE SATURATING TANK
0.4 INCH

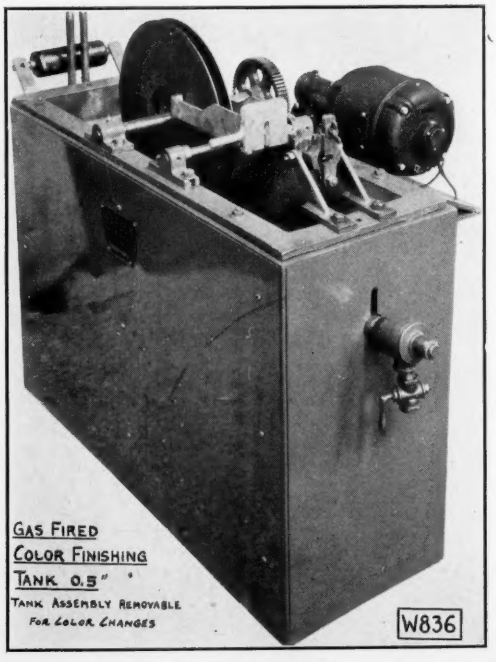


W818

POND TYPE PARAFFIN APPLYING TANK 0.5"
TANK ASSEMBLY REMOVABLE FOR COLOR CHANGES



W820



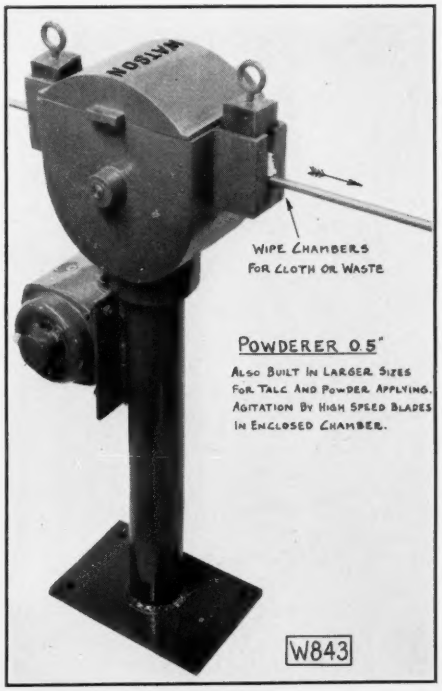
GAS FIRED COLOR FINISHING TANK 0.5"
TANK ASSEMBLY REMOVABLE FOR COLOR CHANGES

W836

Equipment For Saturating And Finishing Of Flame Proof Wire

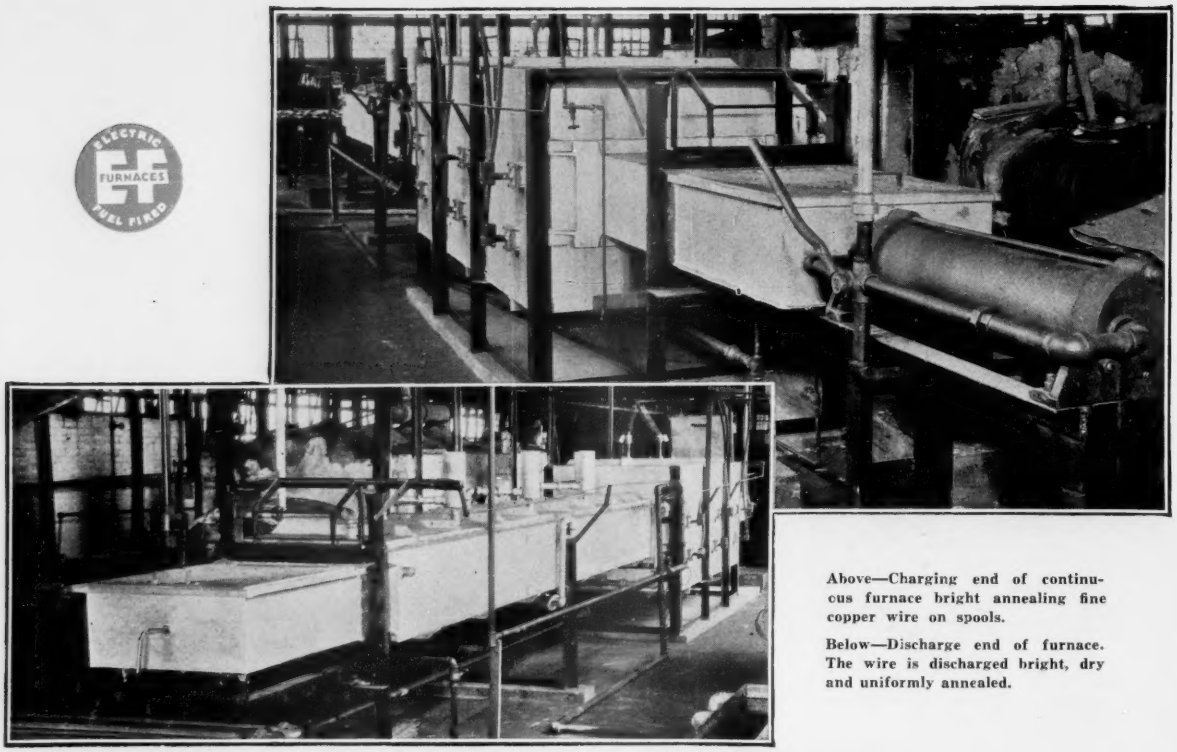
Each Unit In 3 Sizes.

Send For Complete Bulletins.



POWDERER 0.5"
ALSO BUILT IN LARGER SIZES FOR TALC AND POWDER APPLYING. AGITATION BY HIGH SPEED BLADES IN ENCLOSED CHAMBER.

W843



Above—Charging end of continucus furnace bright annealing fine copper wire on spools.

Below—Discharge end of furnace. The wire is discharged bright, dry and uniformly annealed.

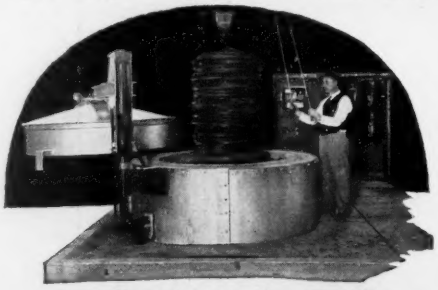
Annealing Fine Copper Wire--

UNIFORMLY, ECONOMICALLY, CONTINUOUSLY --BRIGHT AND DRY

THE above illustration shows a controlled atmosphere, continuous furnace we designed and built for a prominent wire manufacturer for bright annealing fine copper wire on spools.

No steam, vapor or water seals of any kind are employed in this equipment, thus staining is entirely eliminated and no drying necessary;—the wire is delivered from the furnace uniformly annealed, bright and dry, ready for shipment, further processing or fabrication.

This is one of several new types of electric and fuel fired furnaces we have designed and built for the wire industry. If you are interested in improving the quality of your anneal or are contemplating any changes or additions to your furnace equipment, our engineers will be very glad to work with you.



Annealing alloy wire in coils without scale or decarburization.

WE BUILD THE FURNACE TO FIT THE JOB—OIL, GAS OR ELECTRIC

THE ELECTRIC FURNACE CO.

SALEM, OHIO.

FUEL FIRED FURNACES

ELECTRIC FURNACES